

**Navigation Study at the Approach  
to Lock and Dam 24,  
Upper Mississippi River**

**Hydraulic Micro Model  
Investigation**

**Volume 2 of 2**

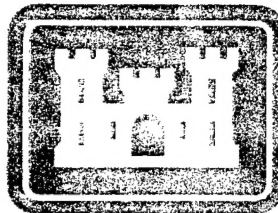
*Jan 98*

**Reproduced From  
Best Available Copy**

**DISTRIBUTION STATEMENT A**  
Approved for Public Release  
Distribution Unlimited

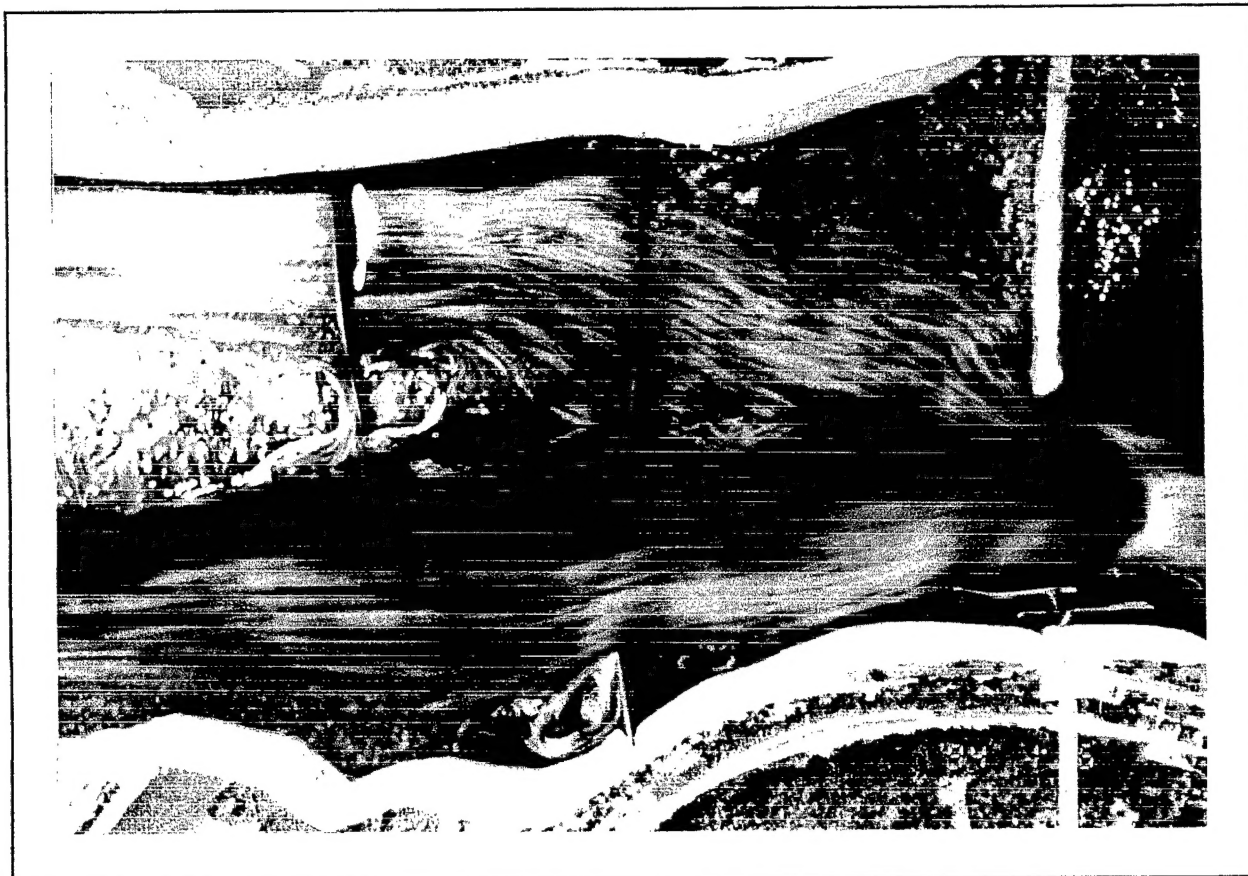
**DTIC QUALITY INSPECTED 4**

**20000703 027**



**US Army Corps  
of Engineers**  
St. Louis District





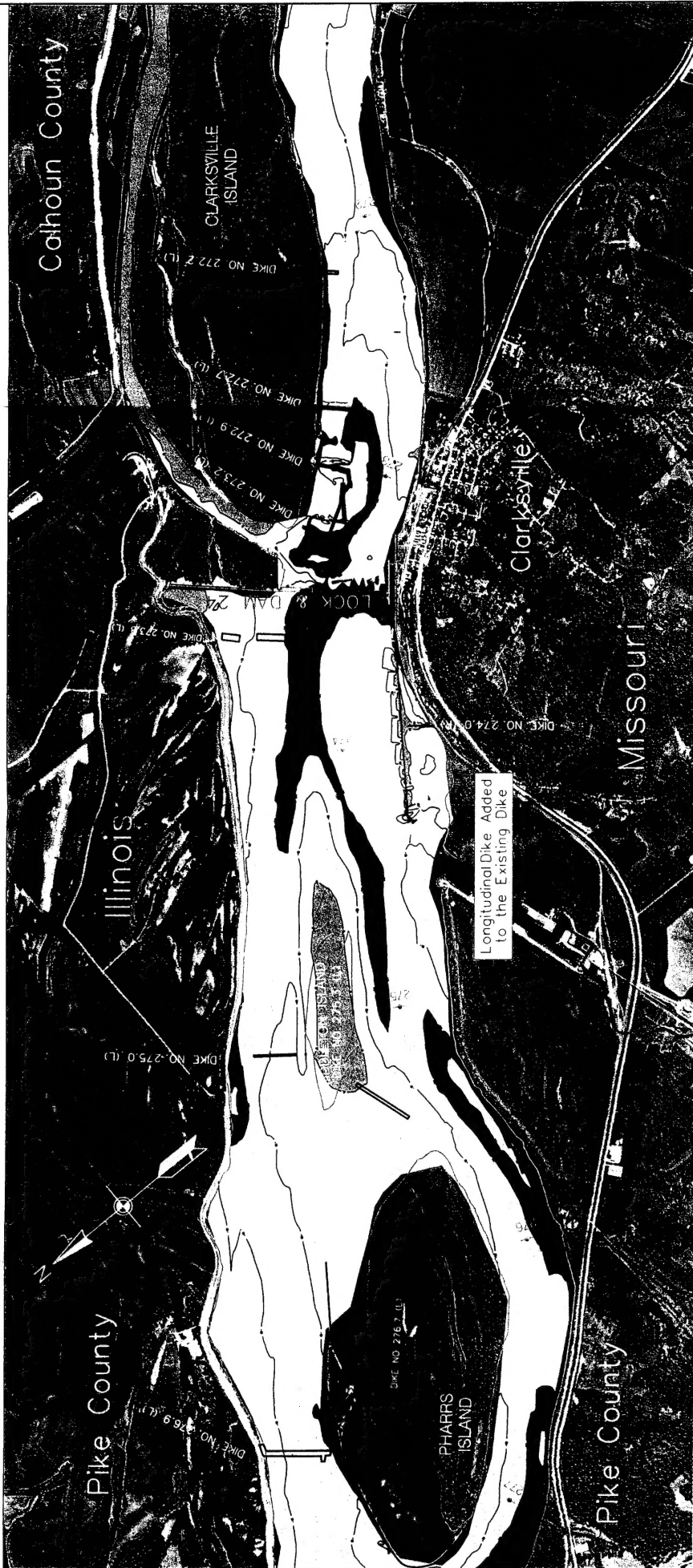
U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Devlin

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277  
Flow Visualization - Alternative D

PLATE NO

35



Elevations Referenced  
to LWRP



U.S. ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

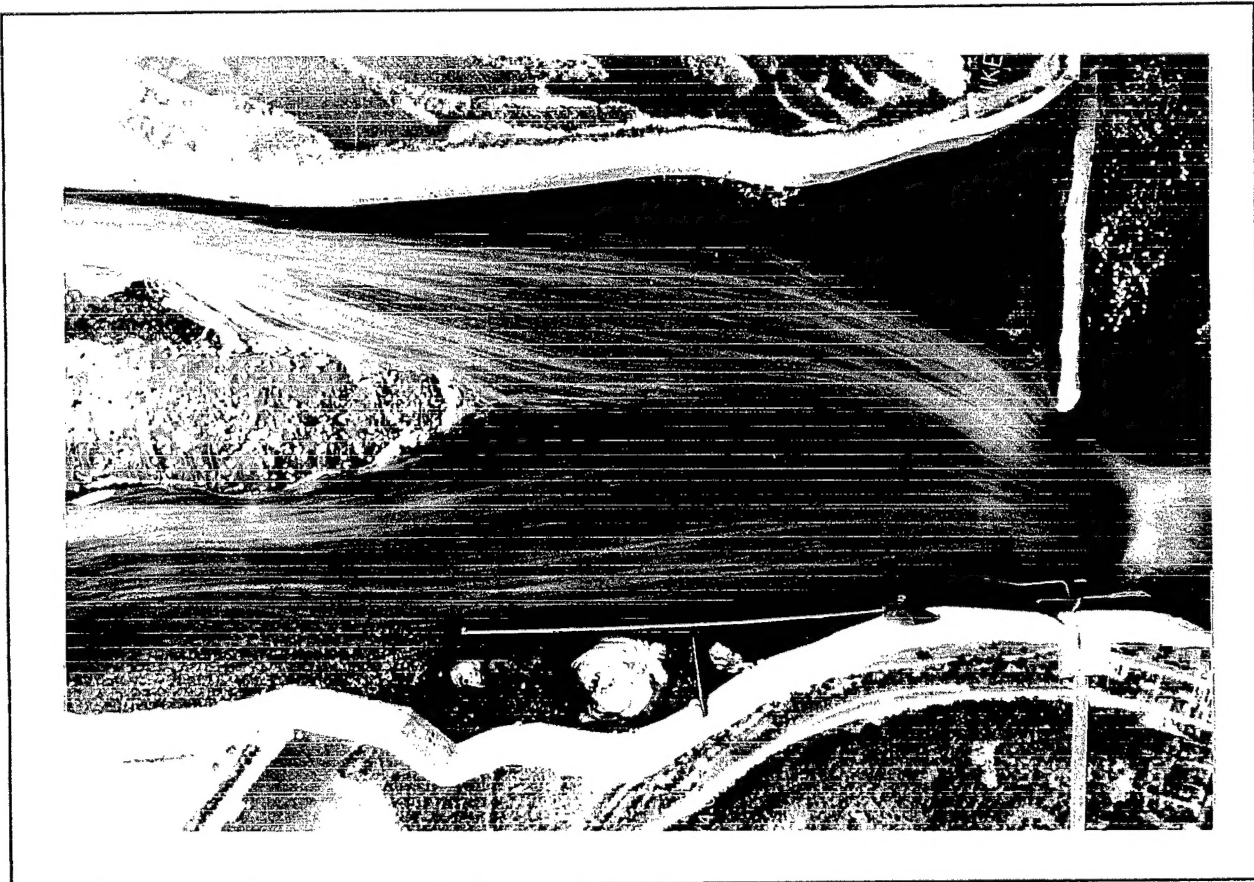
PREPARED BY: D. Cooper  
DRAWN BY: D. Cooper  
CHECKED BY: R. Boushara

Lock and Dam #24 Micro Model Study  
Mississippi River Miles 271 - 277  
Alternative E

1500 1000 500 0

DESIGN FILE: P:\000\MODELS\LD#24  
PLOT SCALE: 1" = 300'





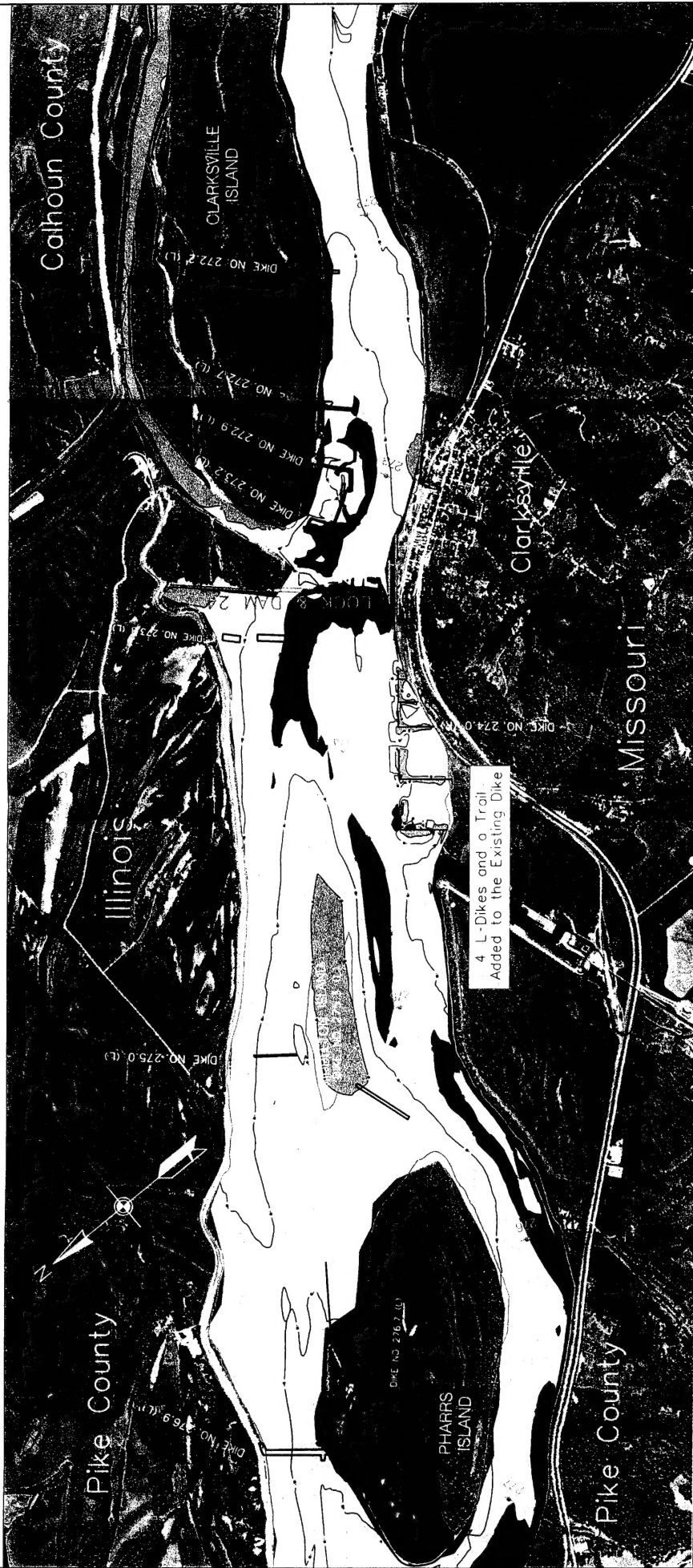
U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. DeMayoy

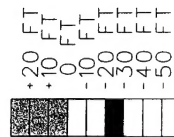
Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277  
Flow Visualization - Alternative E

PLATE NO

37

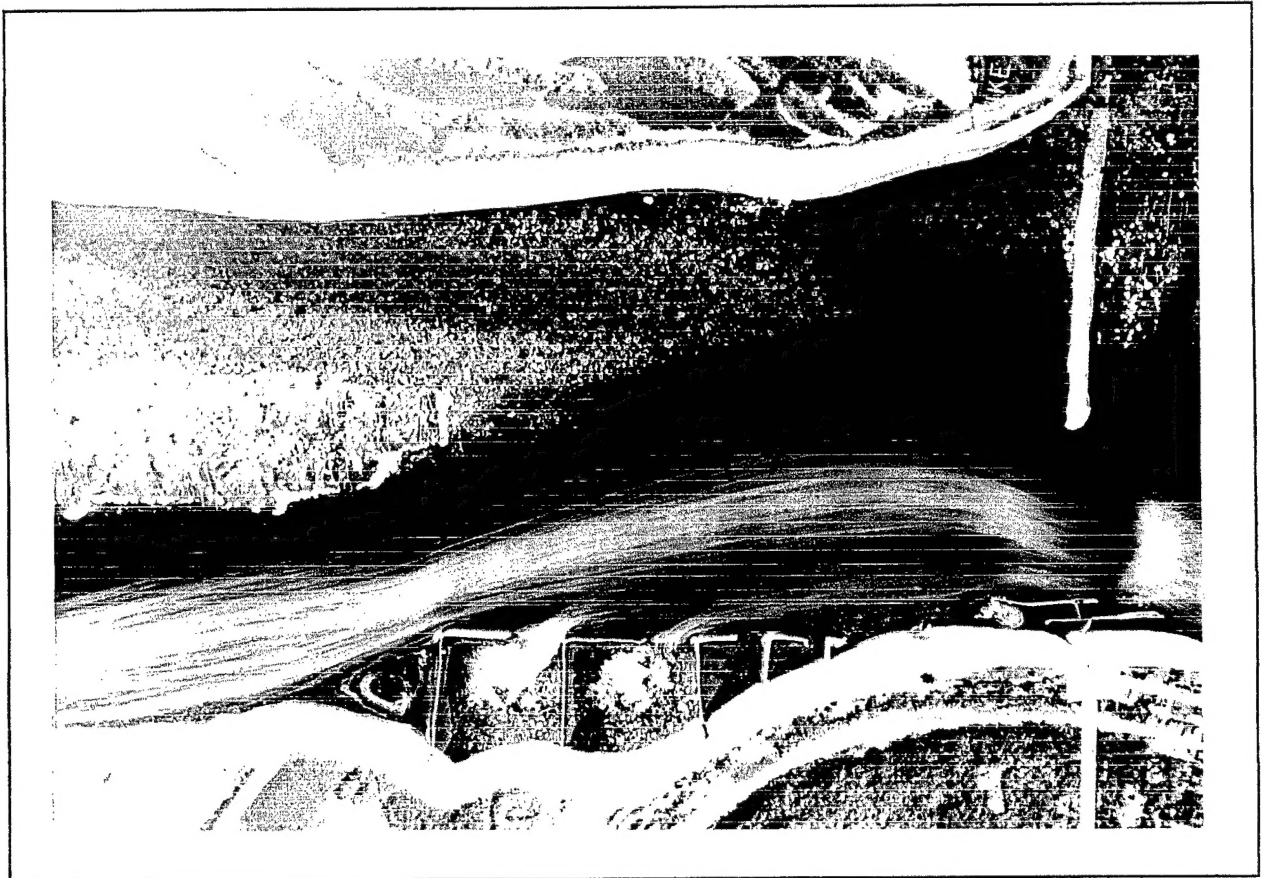


Elevations Referenced  
to LWRP



	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS ST. LOUIS, MISSOURI
	Lock and Dam #24 Micro Model Study Mississippi River Miles 271 - 277 Alternative F
DESIGN FILE: D-100-MODEL-LD-24 PLOT SCALE: 1" = 2000' 1500' 0 500' 1000' 1500'	
PLATE NO. <b>38</b>	

PREPARED BY: D. Carson  
 DRAWN BY: D. Carson  
 CHECKED BY: R. Gentry



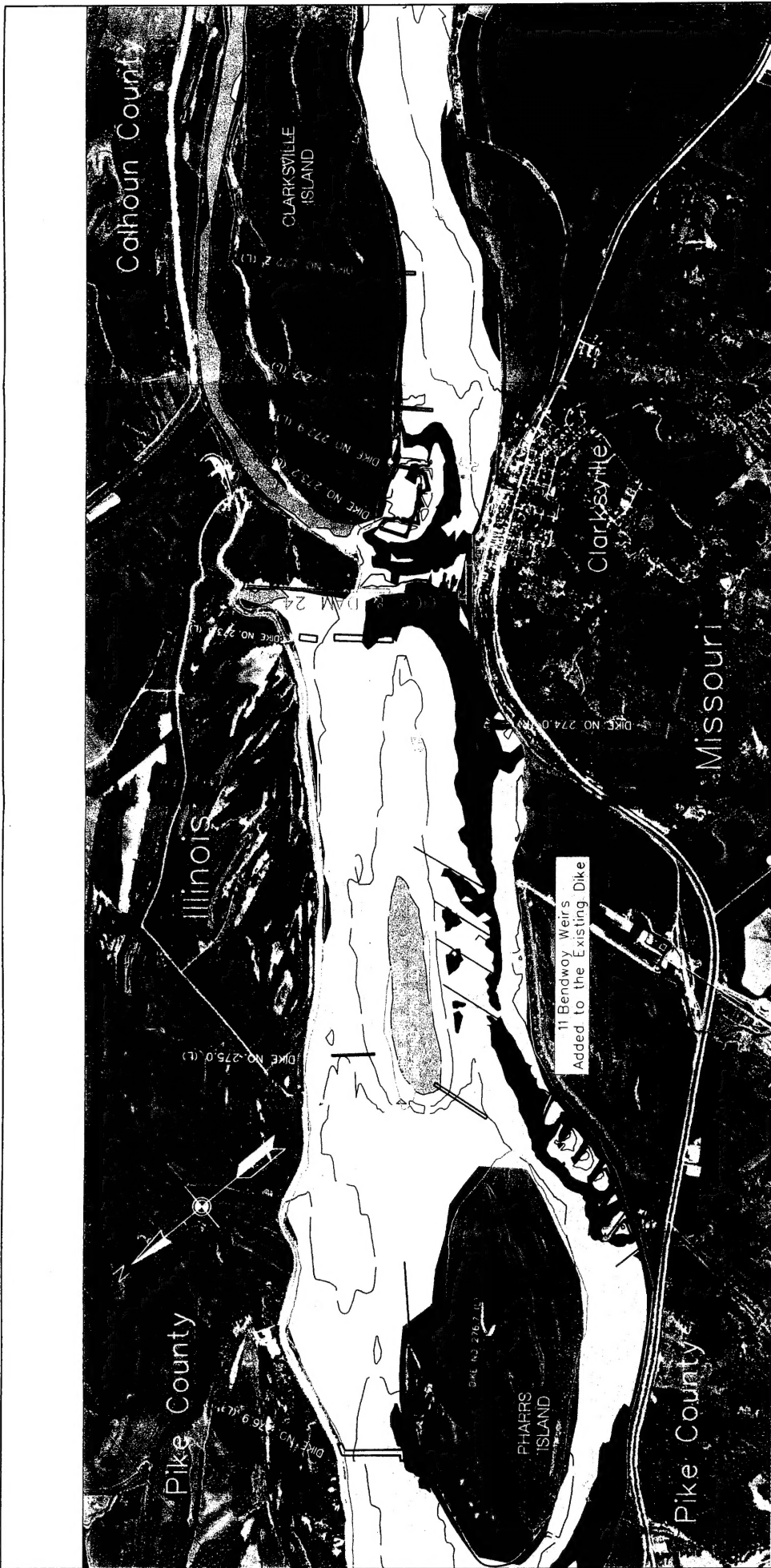
U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Delmroy

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277  
Flow Visualization - Alternative F

PLATE NO

39



Elevations Referenced  
to LWRP



U.S. ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

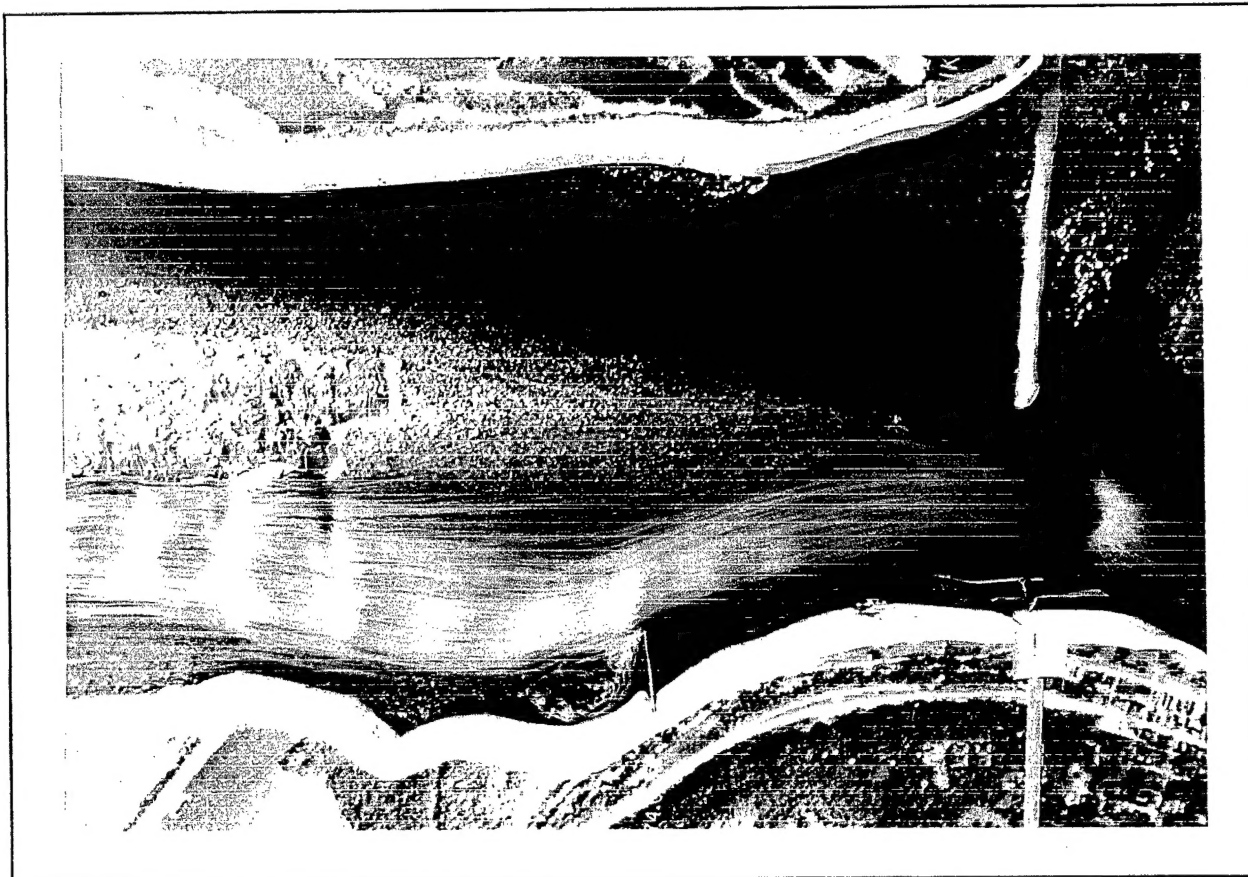
Lock and Dam #24, Micro Model Study  
Mississippi River Miles 271 - 277  
Alternative G

1900 0 500 1000 1500  
Feet

DESIGN FILE D-1000-0000-0000-0000  
PROJECT SCALE 1" = 2000'

PLATE NO.

40



U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

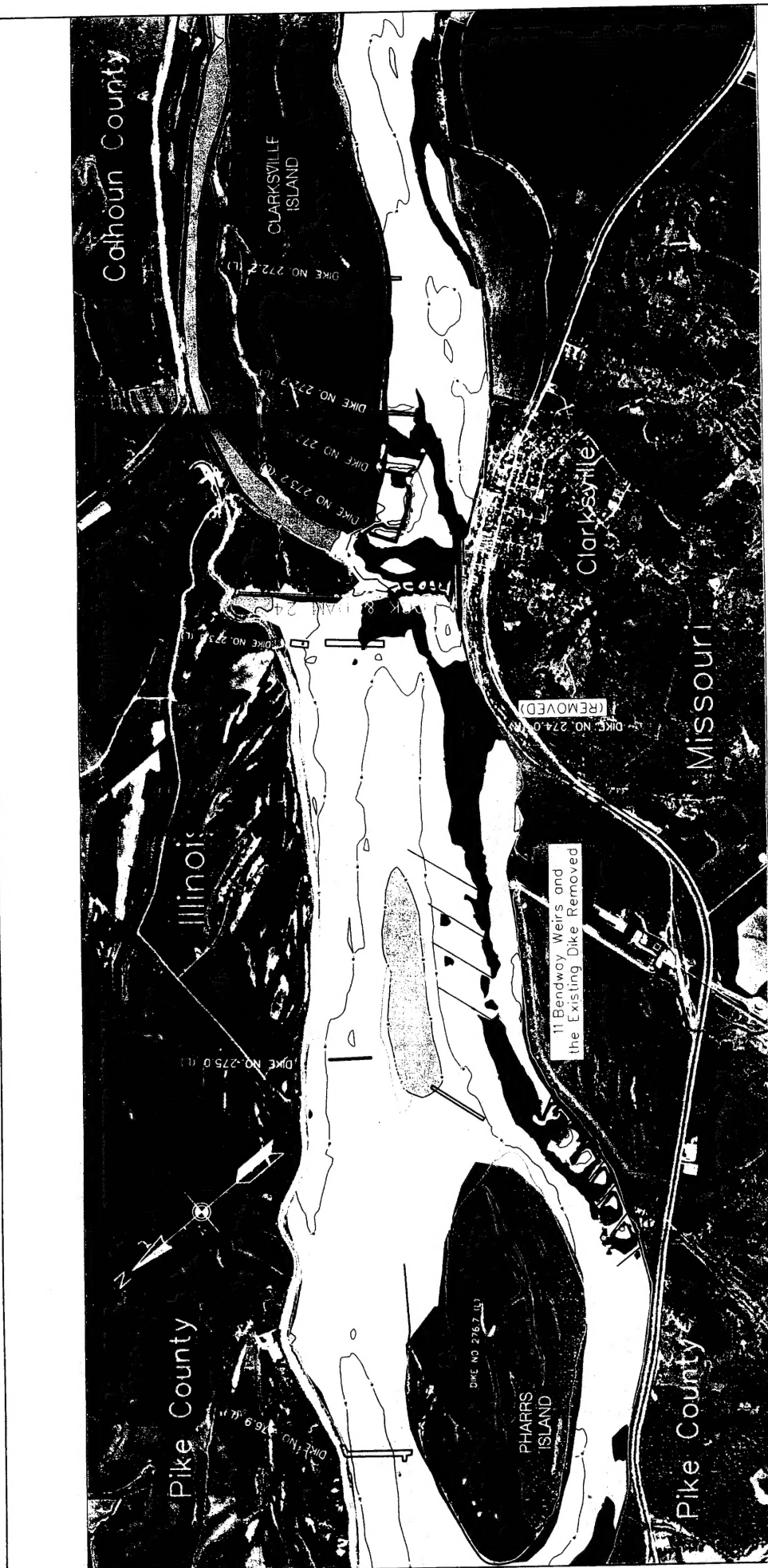
PREPARED BY D. Gordon  
CHECKED BY R. Downroy

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277  
Flow Visualization - Alternative G

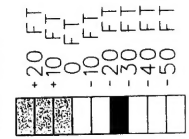
PLATE NO

41

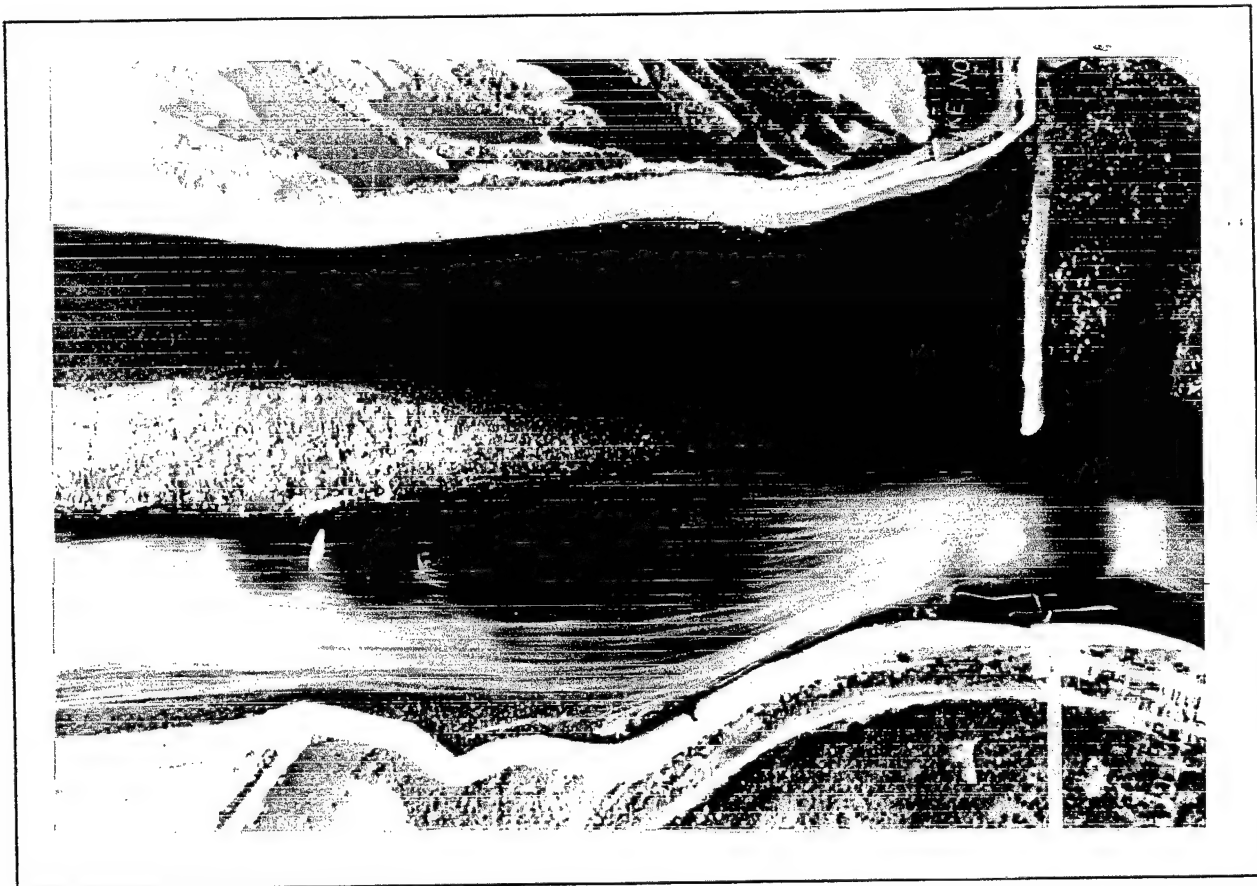




Elevations Referenced  
to LWRP



	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS ST. LOUIS, MISSOURI
	Lock and Dam #24 Micro Model Study Mississippi River Miles 271 - 277 Alternative H
DESIGNED BY: S. G. Gorman CHECKED BY: S. G. Gorman	
1500 0 500 1000 1500 HORIZONTAL SCALE 1" = 2000'	
PAGE NO. <b>42</b>	



U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Dawnsky

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277  
Flow Visualization - Alternative H

PLATE NO

43



Elevations Referenced  
to LWRP



U.S. ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

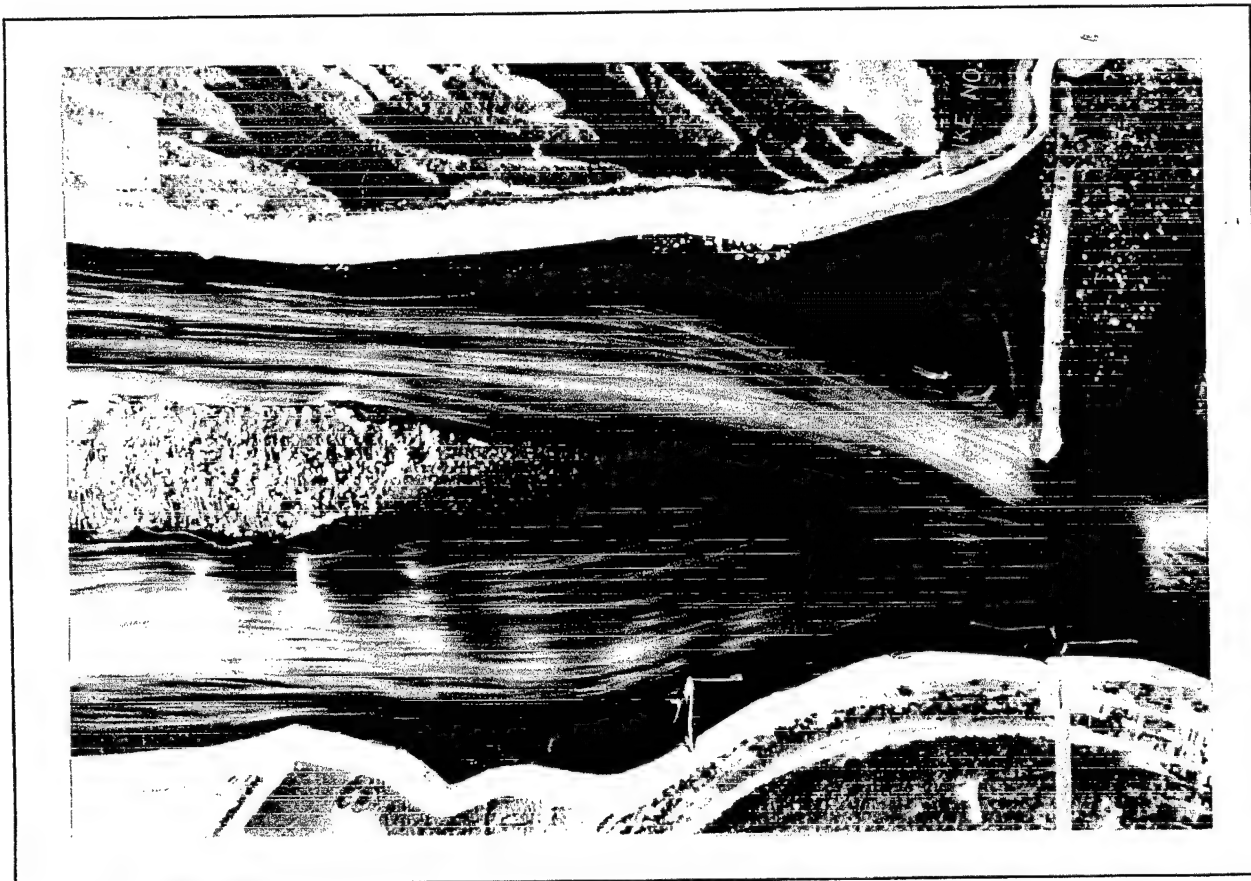
PREPARED BY: E. G. GARDNER  
CHECKED BY: R. A. GARDNER

Lock and Dam #24 Micro Model Study  
Mississippi River Miles 271 - 277  
Alternative I

1500' 0 500' 1000' 1500'

DESIGN FILE: 24-2-2007  
PLOT SCALE: 1" = 2000'

PLATE NO. 44



U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Dantroy

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277

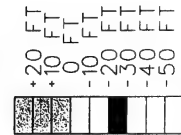
Flow Visualization - Alternative I

PLATE NO

45

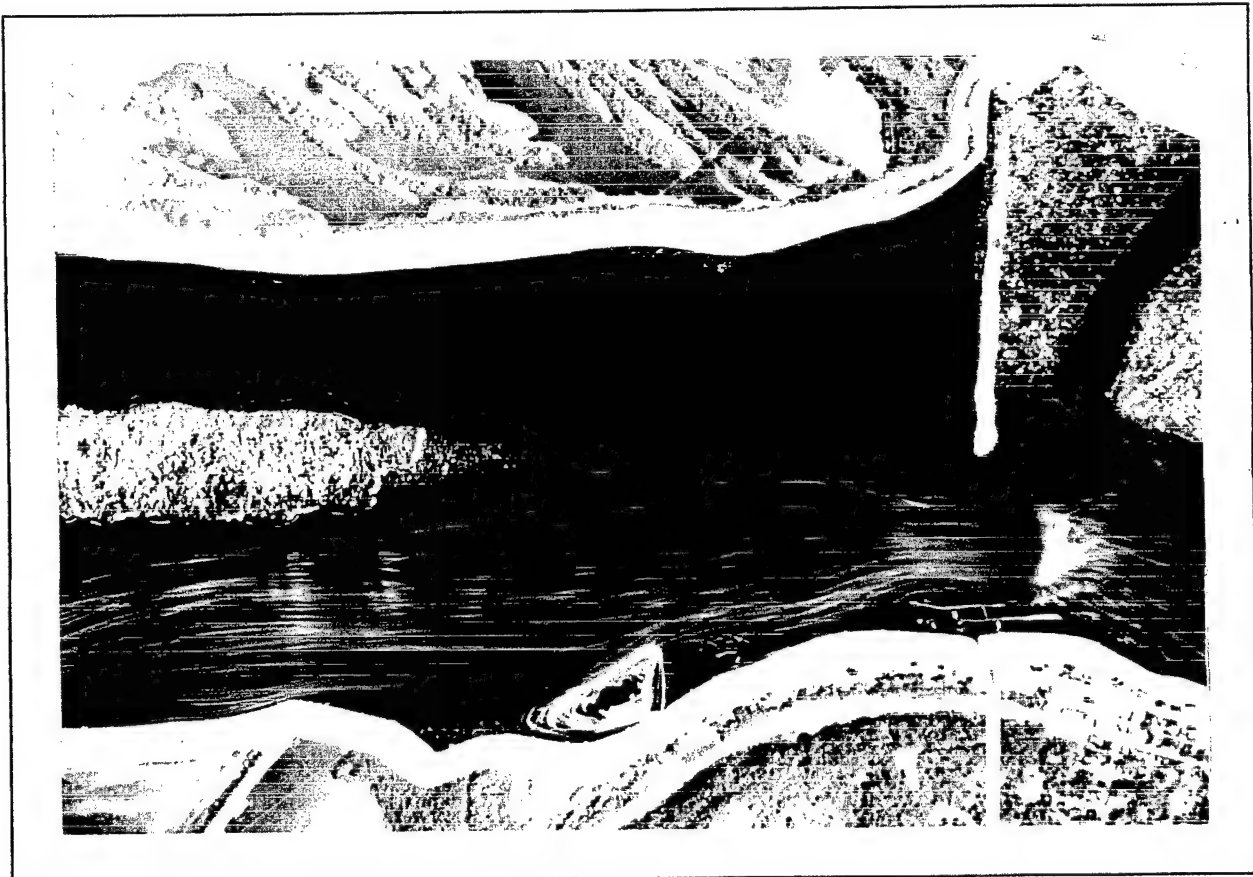


Elevations Referenced  
to LWRP



	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS ST. LOUIS, MISSOURI
	Lock and Dam #24 Micro Model Study Mississippi River Miles 271 - 277 Alternative J
PREPARED BY: E. L. Galt DRAWN BY: S. Galt CHECKED BY: R. Galt	
DESIGN FILE: D-2004-0000-1-000-1-000 PLOT SCALE: 1" = 3000' SHEET NO. 46	





U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D Gordon  
CHECKED BY: R Danner

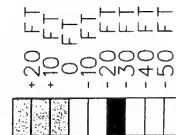
Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277  
Flow Visualization - Alternative J

PLATE NO

47



Elevations Referenced  
to LWRP



	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS ST. LOUIS, MISSOURI
	Lock and Dam #24 Micro Model Study Mississippi River Miles 271 - 277 Alternative K
DESIGN FILE: D-500-Model-LAND-211 SCALE: 1" = 2000' DATE: 10/1/80 PLATE NO: 48	



U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Denviray

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277  
Flow Visualization - Alternative K

PLATE NO

49



Elevations Referenced  
to LWRP



U.S. ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: S. Corbett  
DRAWN BY: S. Corbett  
CHECKED BY: S. Corbett

Lock and Dam #24 Micro Model Study  
Mississippi River Miles 271 - 277  
Alternative 1

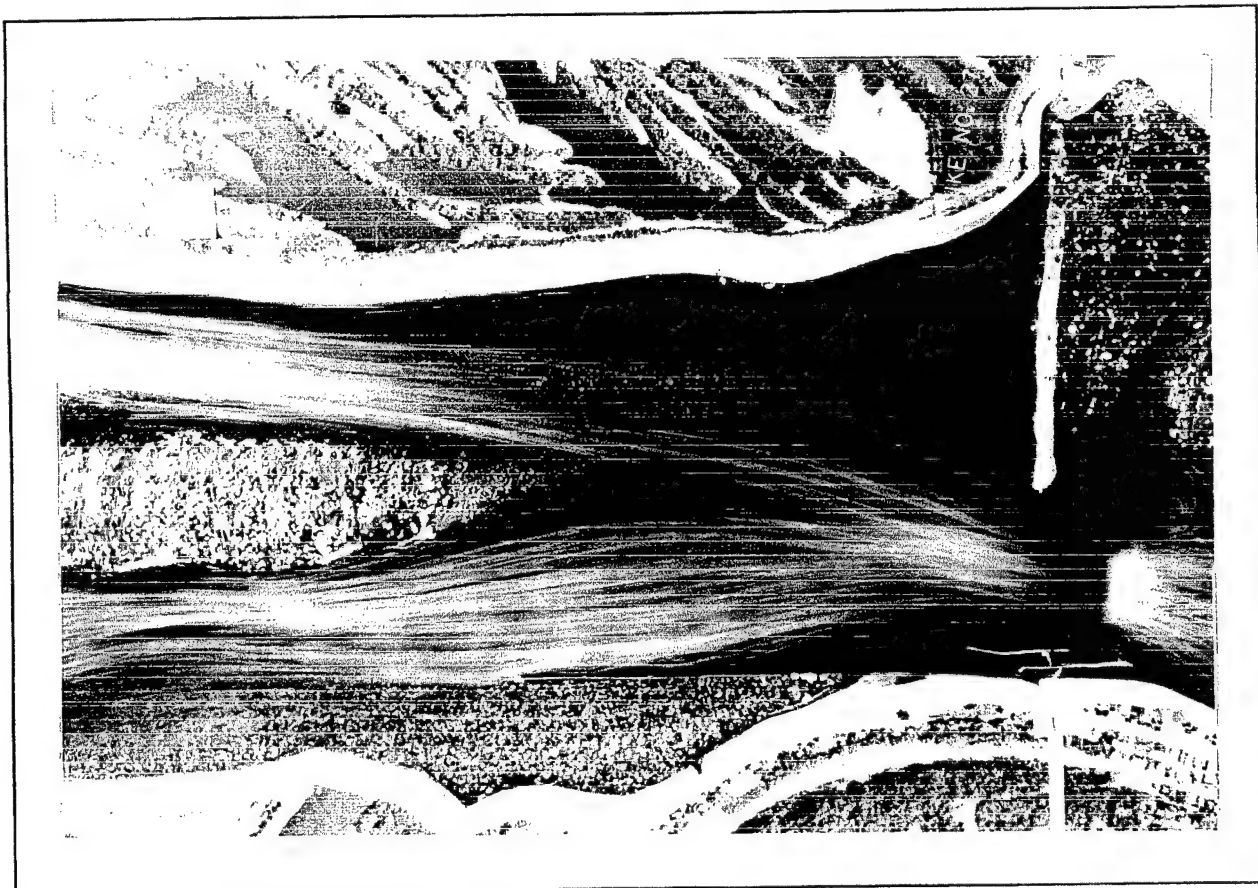
1500 0 500 1000 1500

DESIGN FILE: E:\WORK\MSR\MSR-24\

PLATE NO.

50

PLOT SCALE: 1" = 2000'



**U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI**

PREPARED BY: D. Gordon  
CHECKED BY: R. Dennyroy

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277

Flow Visualization - Alternative L

PLATE NO

**51**





Elevations Referenced  
to LWRP



U.S. ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

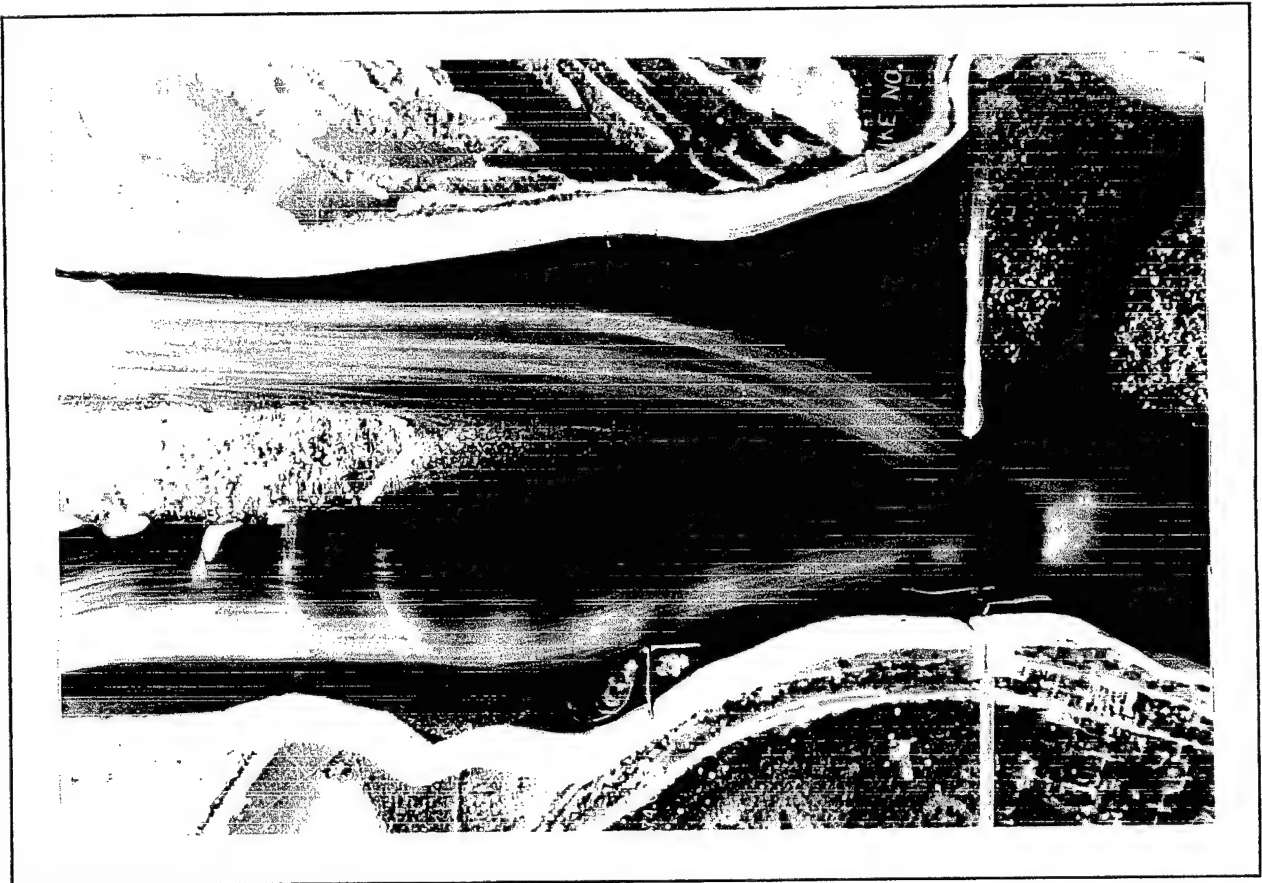
Lock and Dam #24 Micro Model Study  
Mississippi River Miles 271 - 277  
Alternative M

1500 0 500 1000 1500

DESIGN FILE: P-1000000-1000000  
PLOT SCALE: 1" = 2000'

PLATE NO.

52



U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Dawnsroy

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277

Flow Visualization - Alternative M

PLATE NO

53



Elevations Referenced  
to LWRP



U.S. ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

Lock and Dam #24, Micro Model Study  
Mississippi River Miles 271 - 277

Alternative N

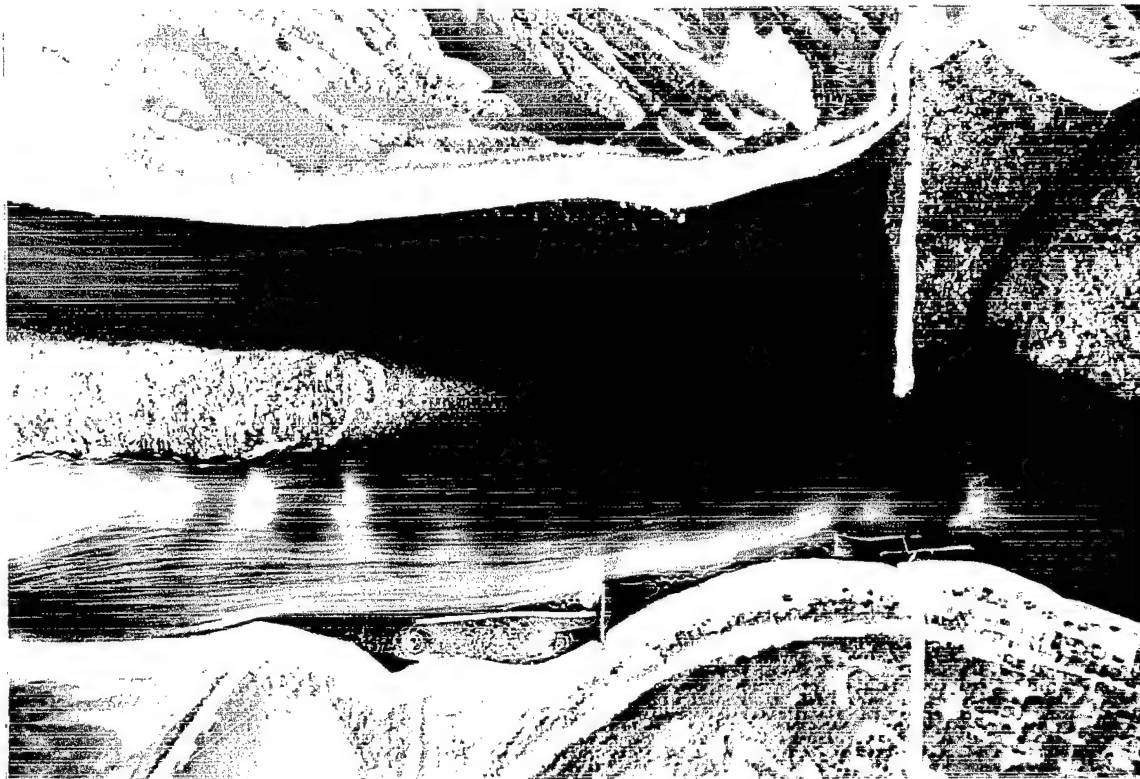
0 500 1000 1500

DESIGN FILE: D:\MICROMODEL\ALB\24\

PLOT SCALE: 1" = 2000'

PLATE NO.

54



U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Dawsey

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277

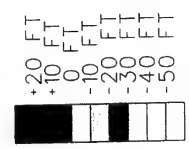
Flow Visualization - Alternative N

PLATE NO

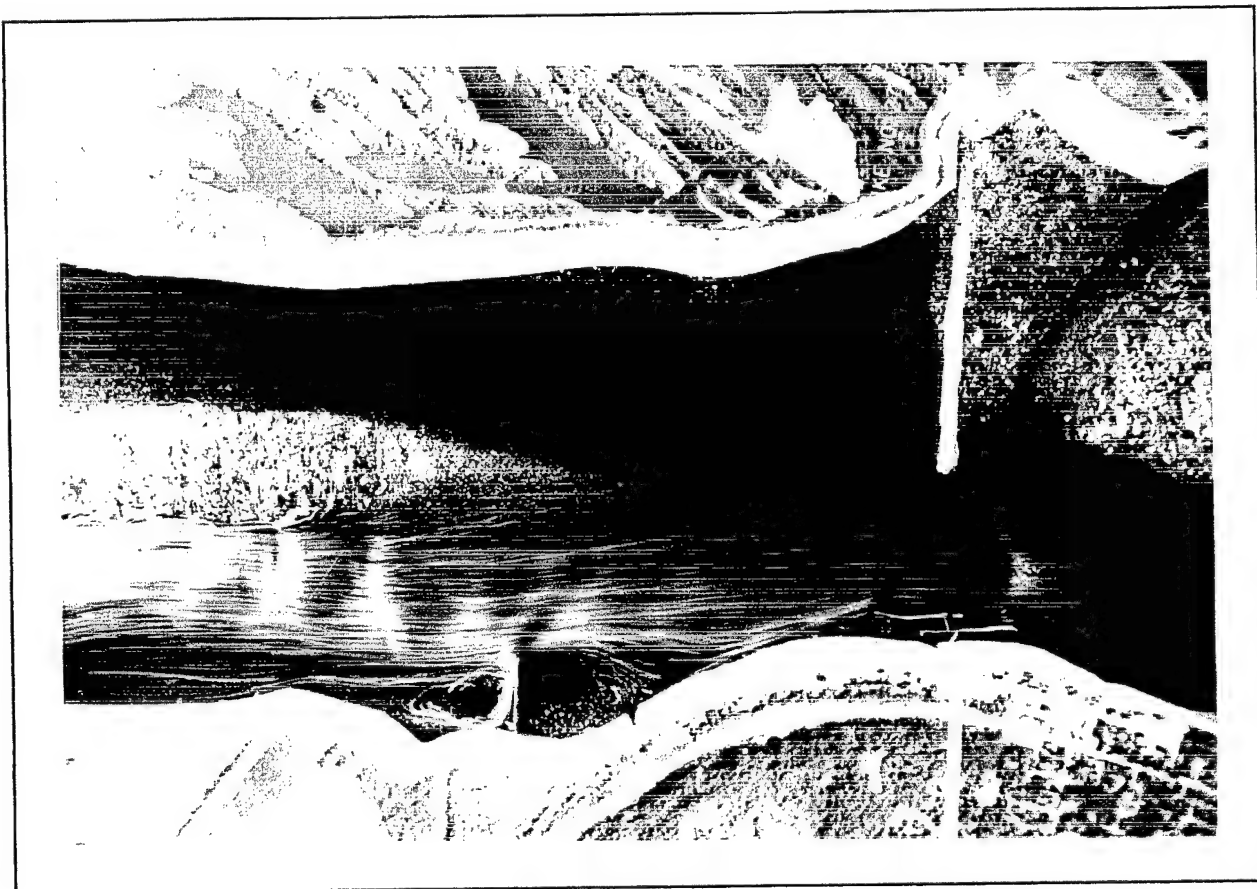
55



Elevations Referenced  
to LWRP



	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS ST. LOUIS, MISSOURI
	Lock and Dam #24 Micro Model Study Mississippi River Miles 271 - 277 Alternative Q
	DESIGNED BY: D. Gordon DRAWN BY: D. Gordon CHECKED BY: R. Duvvury 0 500' 1000' 1500' DESIGN FILE: D:\DDM\MODEL\MSD-24\1 PLOT SCALE: 1" = 3000' PLATE NO. 56



U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Denviray

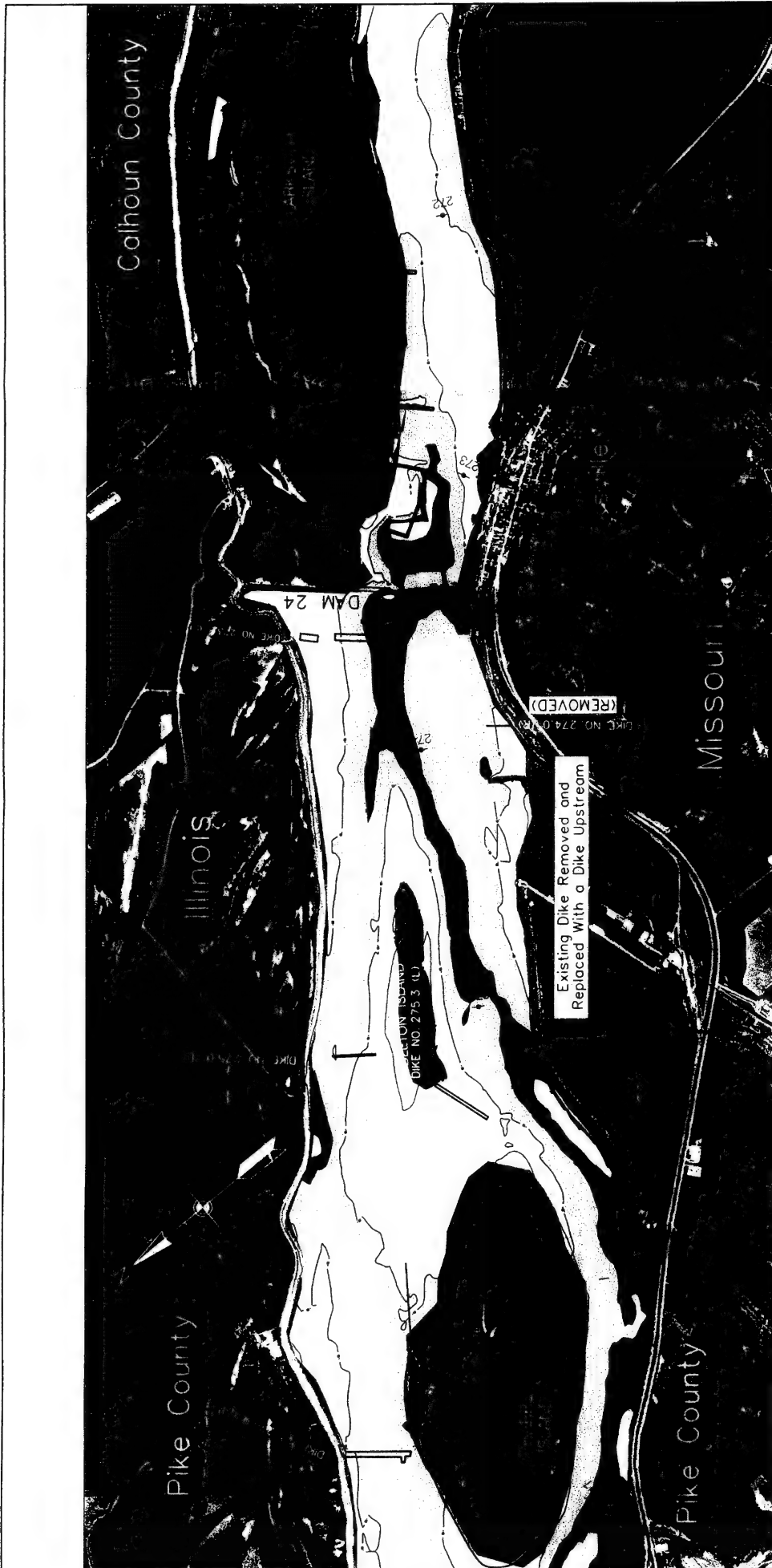
Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277

Flow Visualization - Alternative O

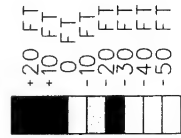
PLATE NO

57

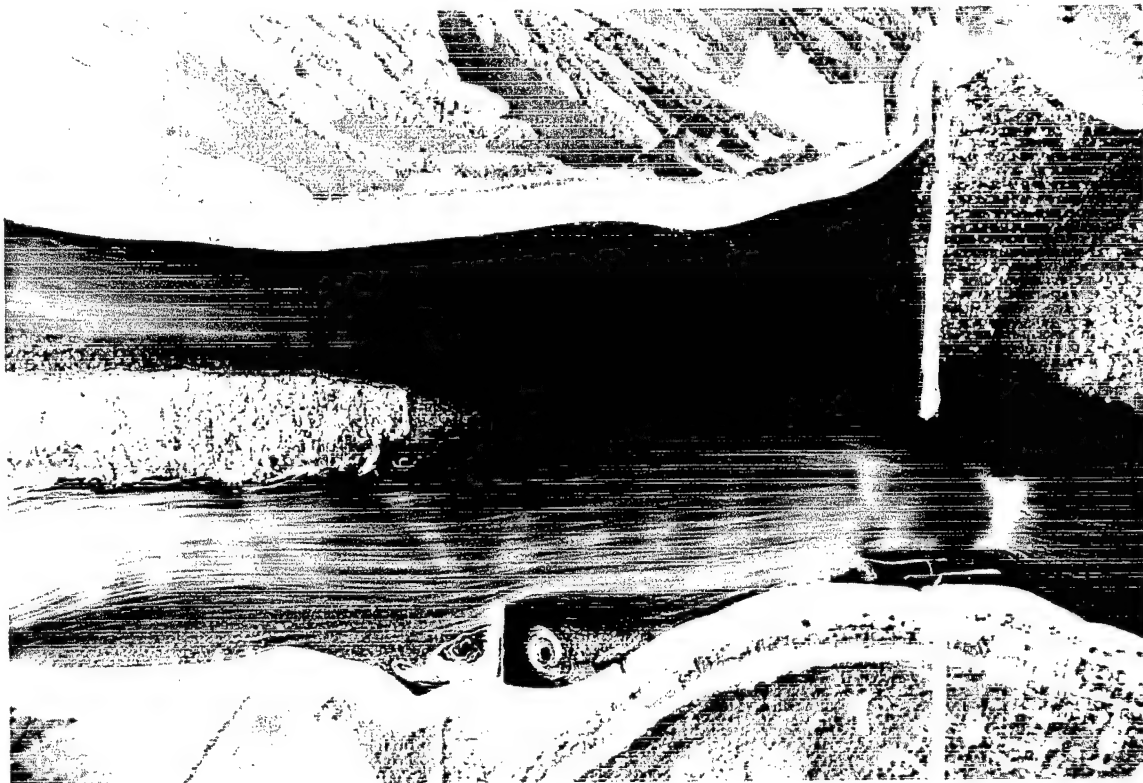




Elevations Referenced  
to LWRP



	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS ST. LOUIS, MISSOURI
	Lock and Dam #24 Micro Model Study Mississippi River Miles 271 - 277 Alternative P 1900 0 500 1000 1500 FEET
DESIGNED BY: D. Green DRAWN BY: D. Green CHECKED BY: R. Harvey	
DESIGN FILE: D:\VOR\MODELS\LD24\1 PLOT SCALE: 1" = 200' PLATE NO. <b>58</b>	



U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Denny

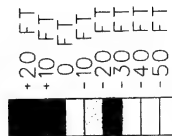
Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277  
Flow Visualization - Alternative P


PLATE NO

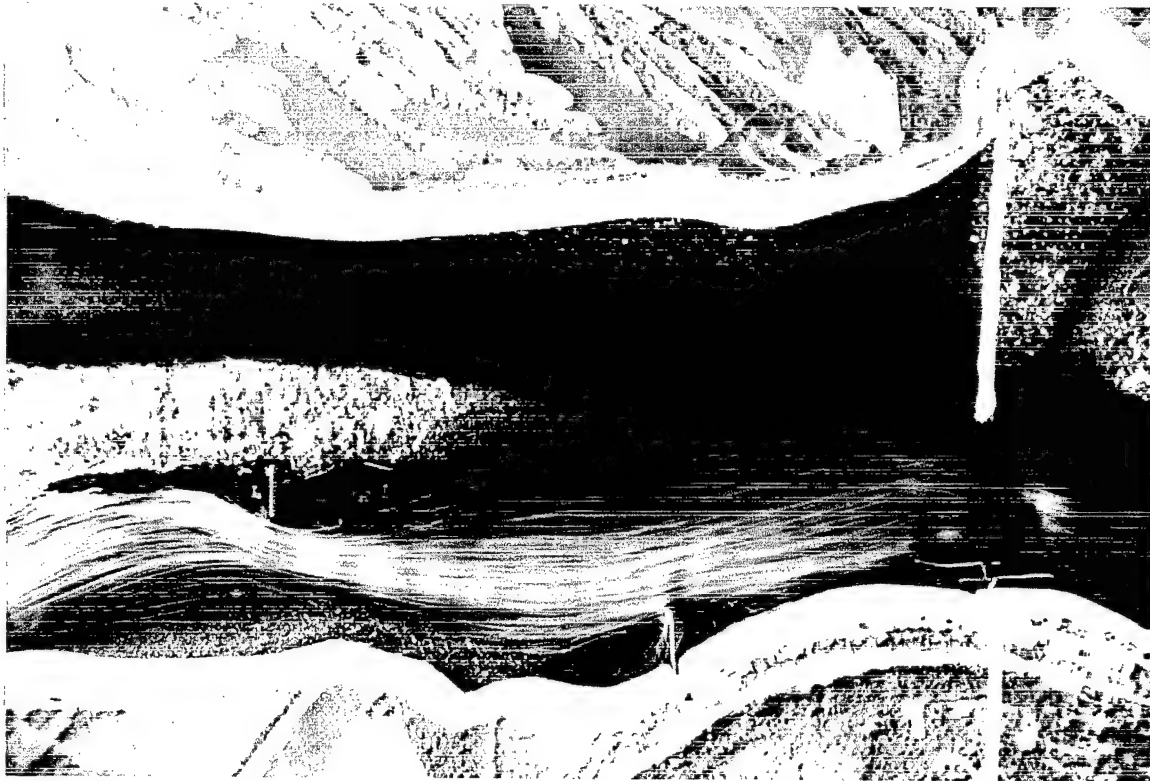
59



Elevations Referenced  
to LWRP



 <p>PREPARED BY: S. Cooper DRAWN BY: S. Cooper CHECKED BY: R. Quinley</p>	<p>U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS ST. LOUIS, MISSOURI</p> <p>Lock and Dam #24 Micro Model Study Mississippi River Miles 271 - 277 Alternative Q</p> <p>1500' 0' 500' 1000' 1500'</p> <p>DESIGN FILE: D-100-MODEL-LWRP-24 PLOT SCALE: 1" = 2000'</p> <p>PLATE NO. <b>60</b></p>
--	---



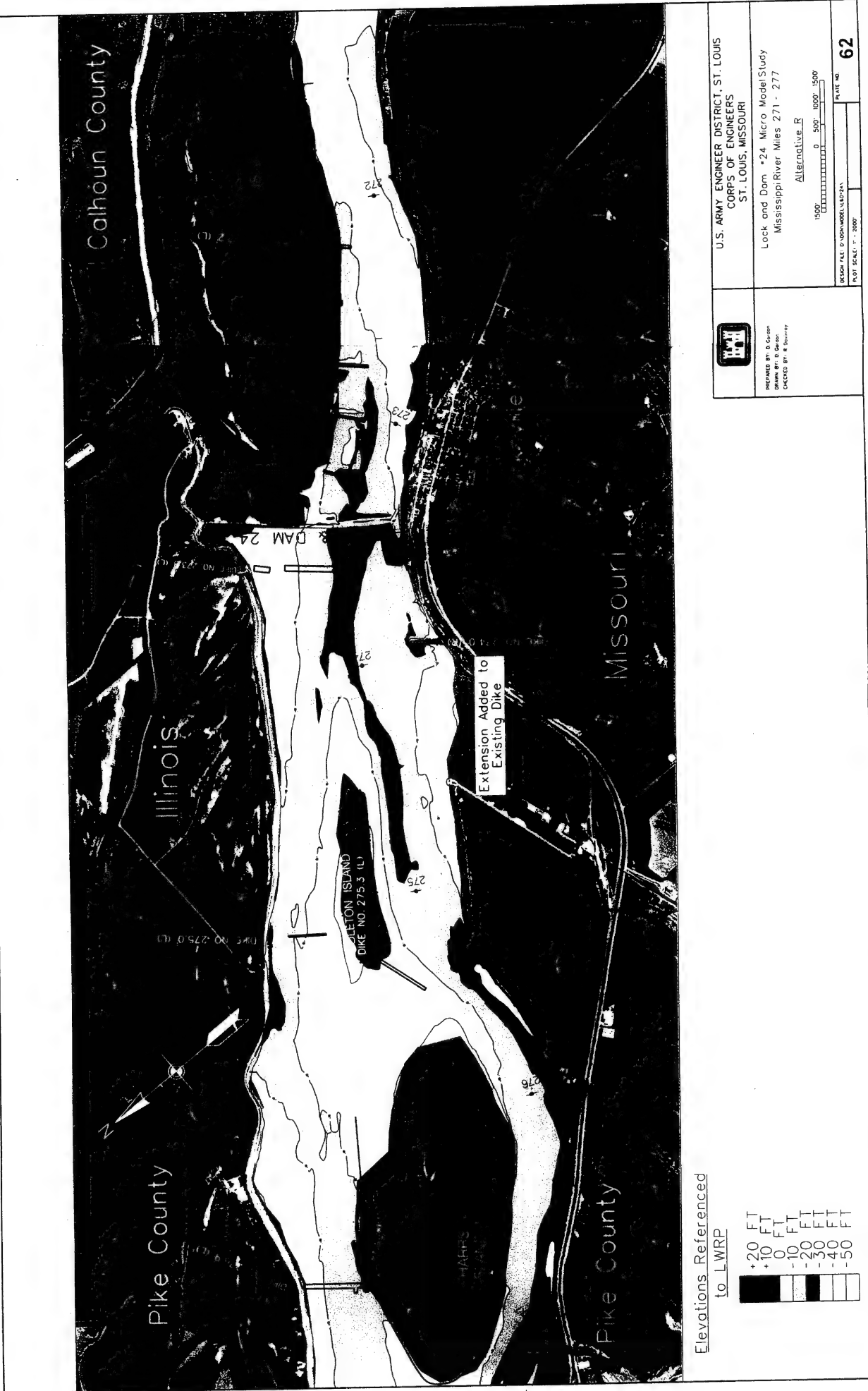
U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. DeMay

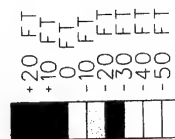
Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277  
Flow Visualization - Alternative Q

PLATE NO

61



Elevations Referenced  
to LWRP



U.S. ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

Lock and Dam #24 Micro Model Study  
Mississippi River Miles 271 - 277

Alternative B

1500 0 500' 1000' 1500'

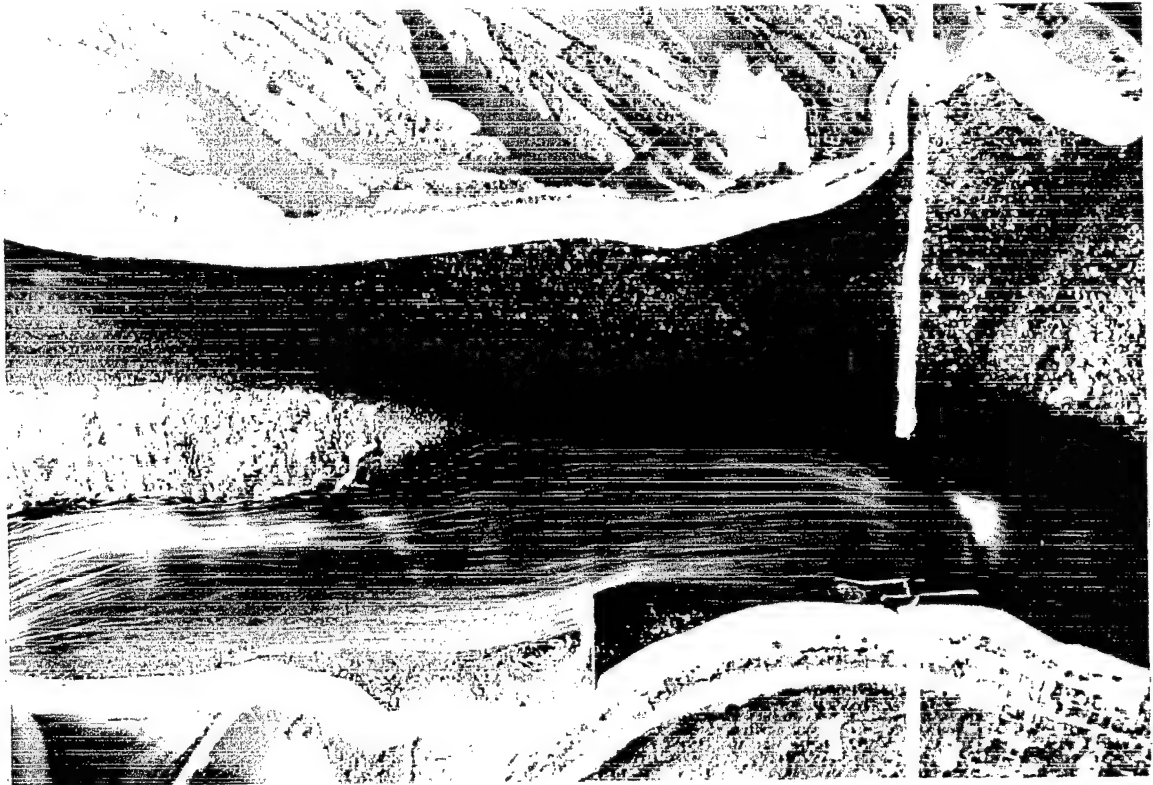
DESIGN FILE D:\000\MODEL\ALP24\A

PLOT SCALE 1" = 2000'

PLATE NO

62

PREPARED BY: D. Gorman  
DRAWN BY: D. Gorman  
CHECKED BY: R. Boudreau



U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Dinkley

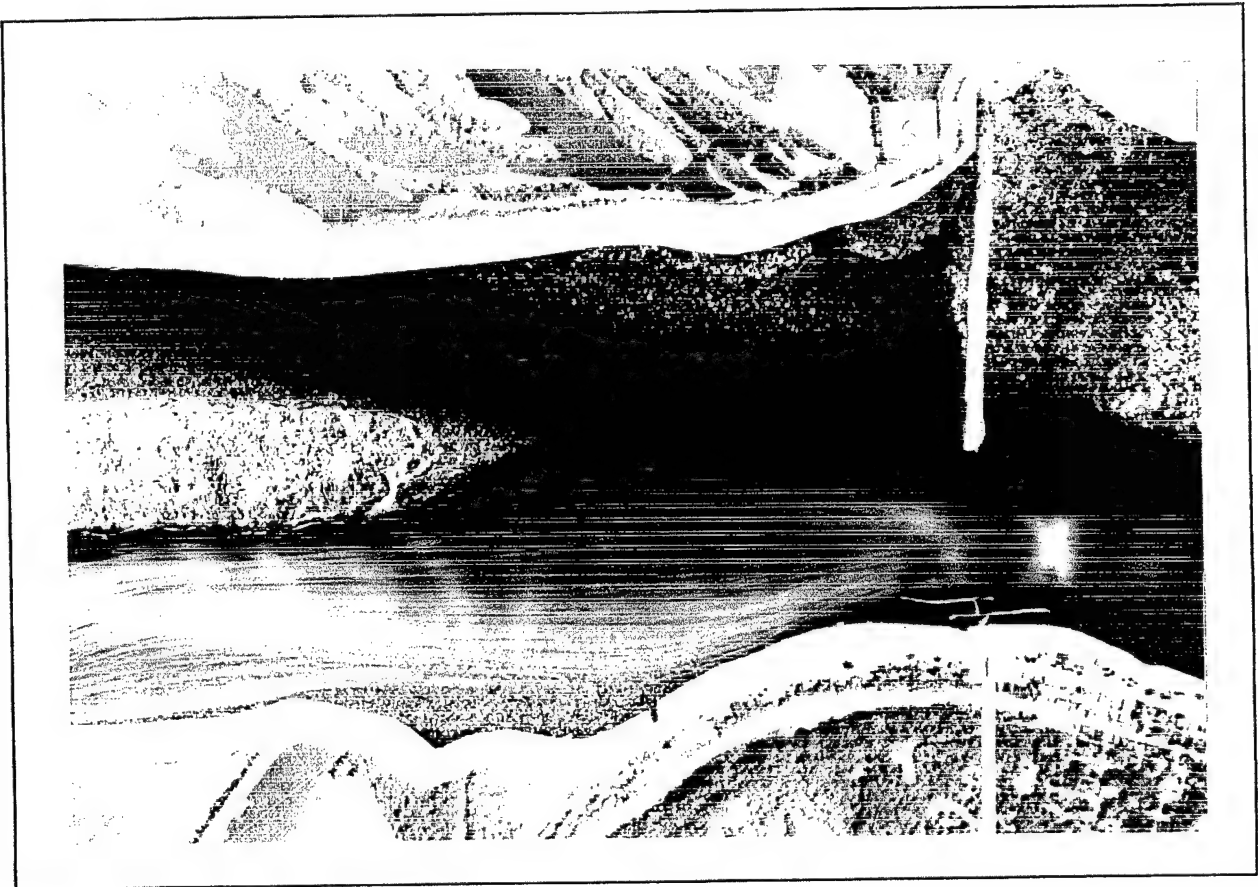
Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277  
Flow Visualization - Alternative R

PLATE NO.

63







U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D Gordon  
CHECKED BY: R Denviray

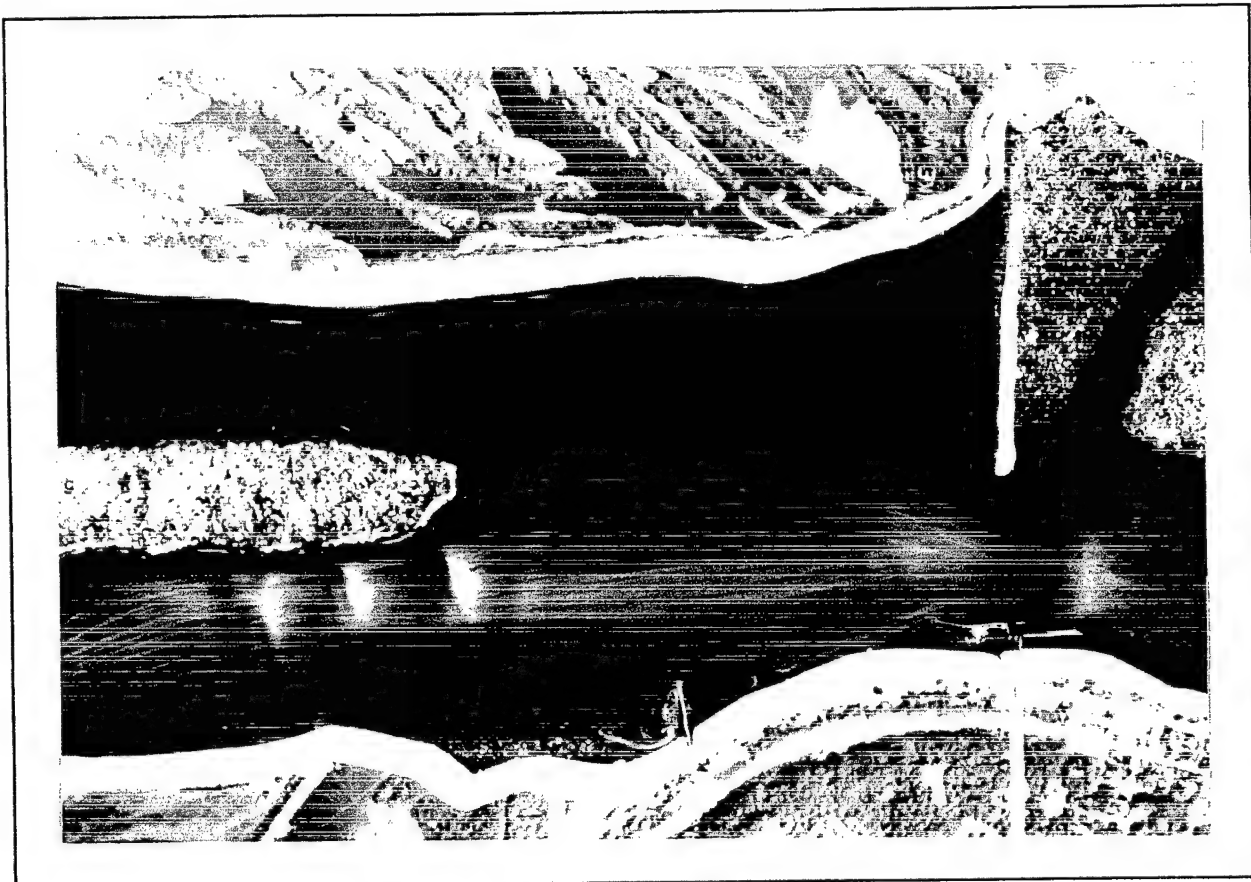
Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277

Flow Visualization - Alternative S

PLATE NO

65





U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Davinroy

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277  
Flow Visualization - Alternative T

PLATE NO

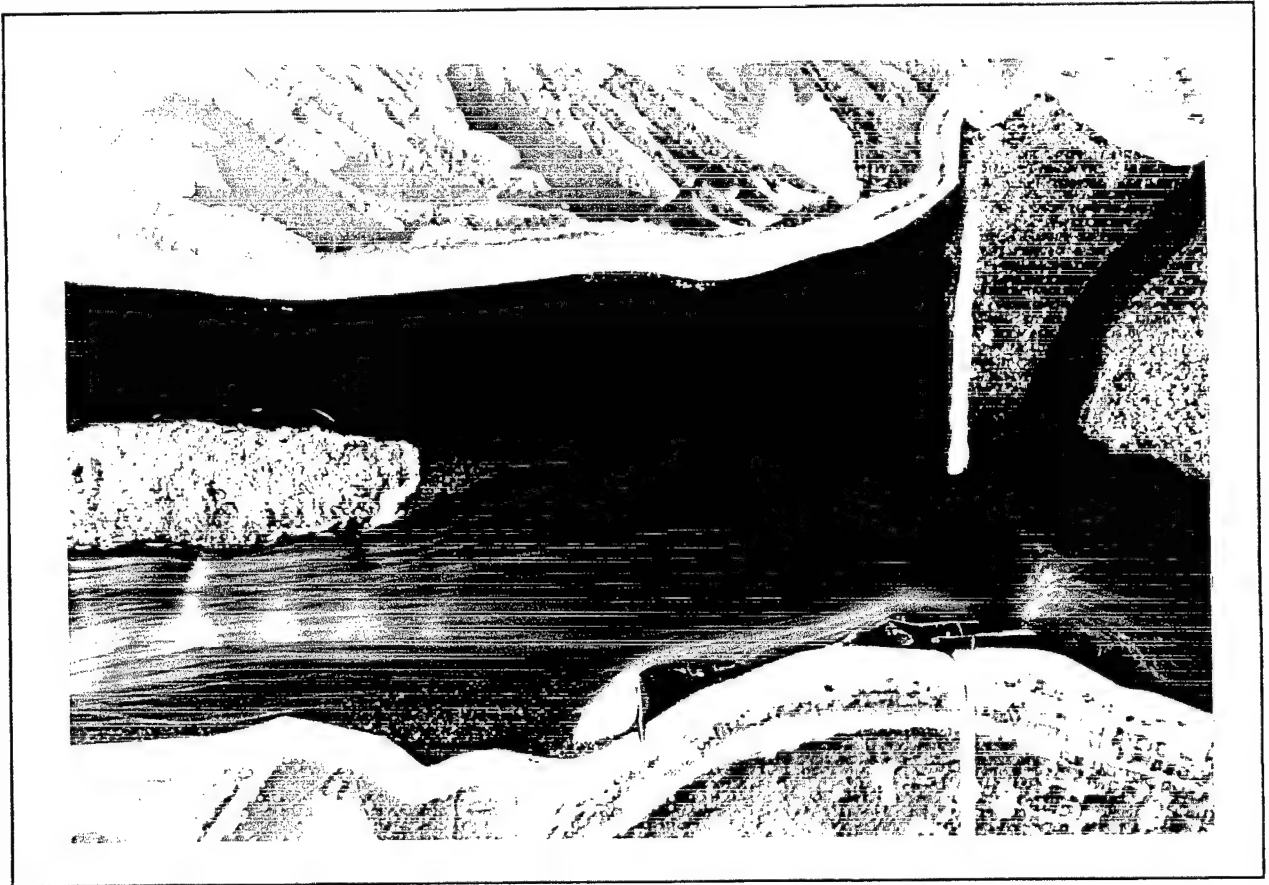
67



Elevations Referenced  
to LWRP



	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS ST. LOUIS, MISSOURI
	Lock and Dam #24 Micro Model Study Mississippi River Miles 271 - 277 Alternative U
DESIGN FILE: D-1000-1000-1000 PLOT SCALE: 1" = 2000' PLATE NO. <b>68</b>	



U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Dainoff

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277

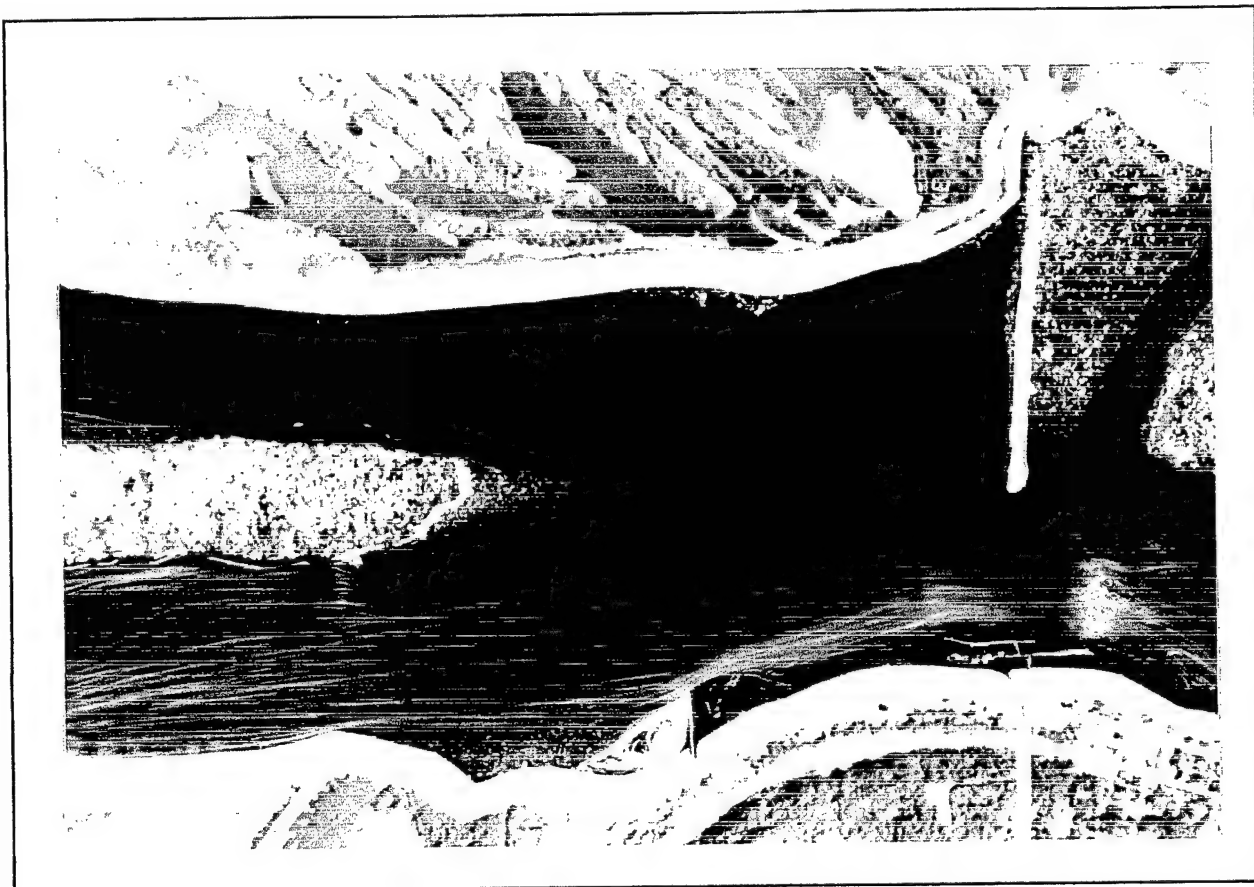
Flow Visualization - Alternative U

PLATE NO

69







U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. DeVinney

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277

Flow Visualization - Alternative V

PLATE NO

71



Elevations Referenced  
to LWRP



U.S. ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

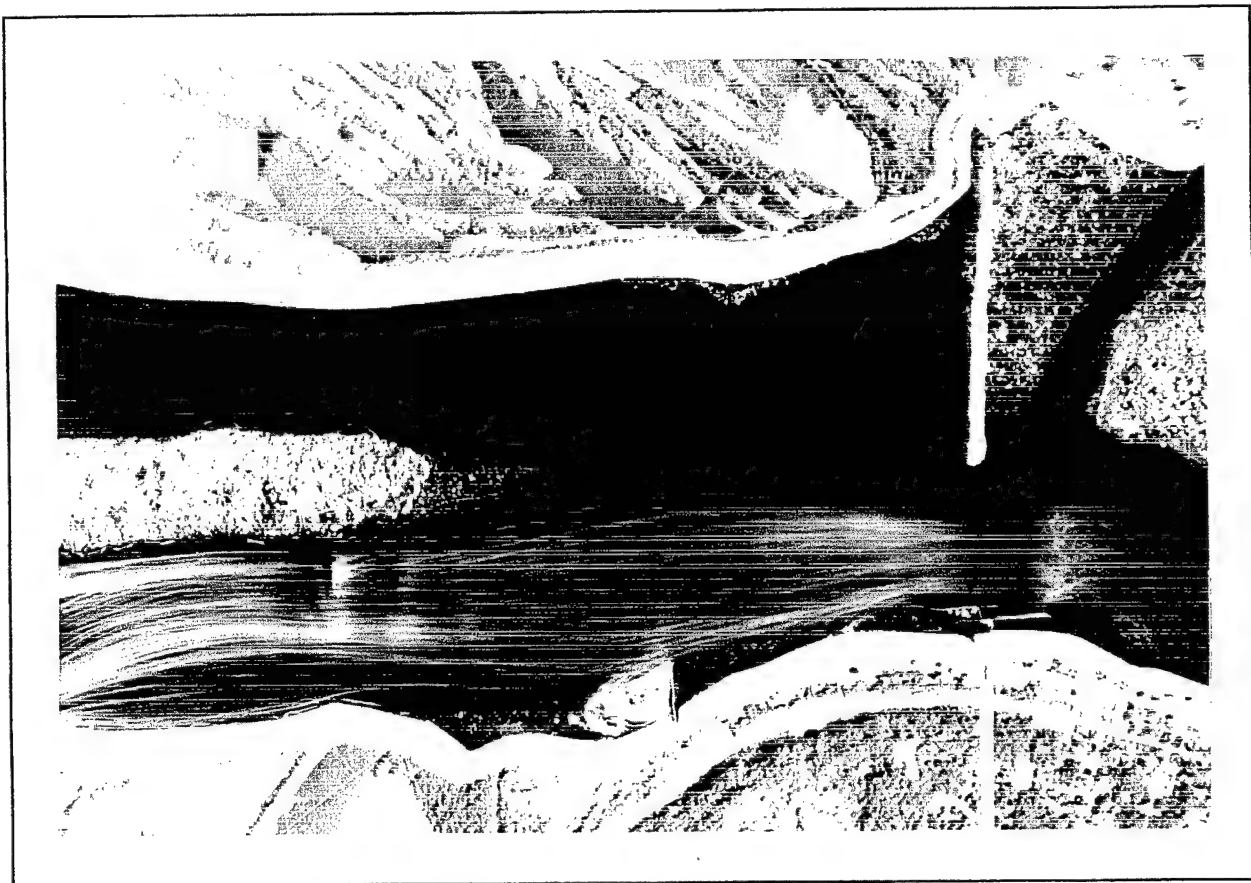
Lock and Dam #24 Micro Model Study  
Mississippi River Miles 271 - 277

Alternative W

0 500 1000 1500

DESIGN FILE D:\000\MO\14807-24  
PLOT SCALE 1" = 1000'

PLATE NO  
72



U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Davinray

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277

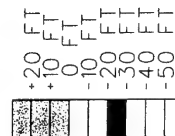
Flow Visualization - Alternative W

PLATE NO

73



Elevations Referenced  
to LWRP



PREPARED BY: S. G. Gorman  
DRAWN BY: S. G. Gorman  
CHECKED BY: R. D. Doney

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

Lock and Dam #24 Micro Model Study  
Mississippi River Miles 271 - 277  
Alternative X

1500' 0' 500' 1000' 1500'

DESIGN FILE: RUSGWADEL/MD-24  
PLOT SCALE: 1" = 2000'

PLATE NO  
74



U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Dainoff

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277

Flow Visualization - Alternative X

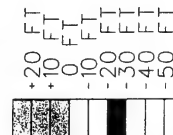
PLATE NO

**75**

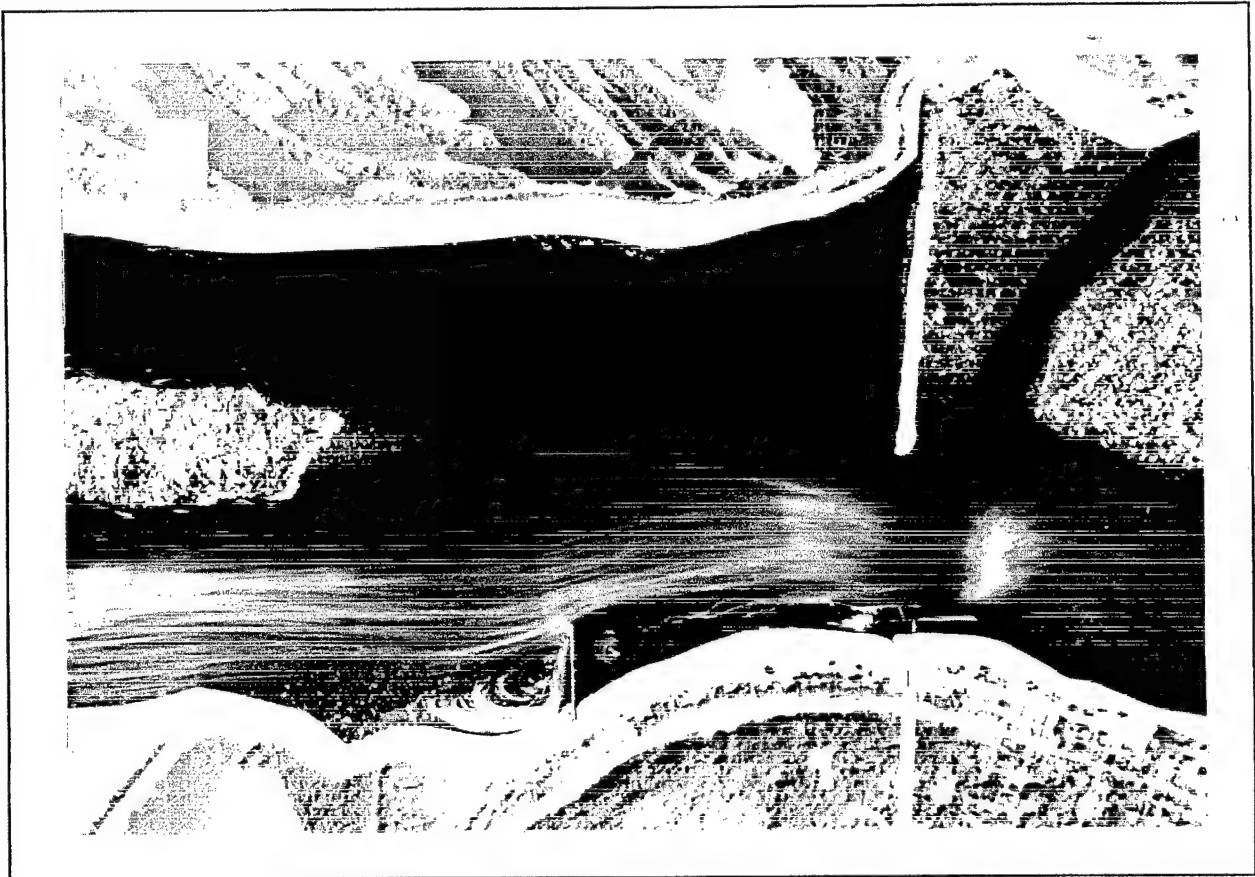




Elevations Referenced  
to LWRP



	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS ST. LOUIS, MISSOURI
	Lock and Dam #24 Micro Model Study Mississippi River Miles 271 - 277 Alternative Y 1500' 0' 500' 1000' 1500' DESIGN FILE: D-50M-MODEL-ALTDY-Y PLOT SCALE: 1" = 2000'
PLATE NO. <b>76</b>	



U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Dainoff

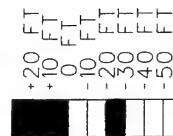
Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277  
Flow Visualization - Alternative Y

PLATE NO

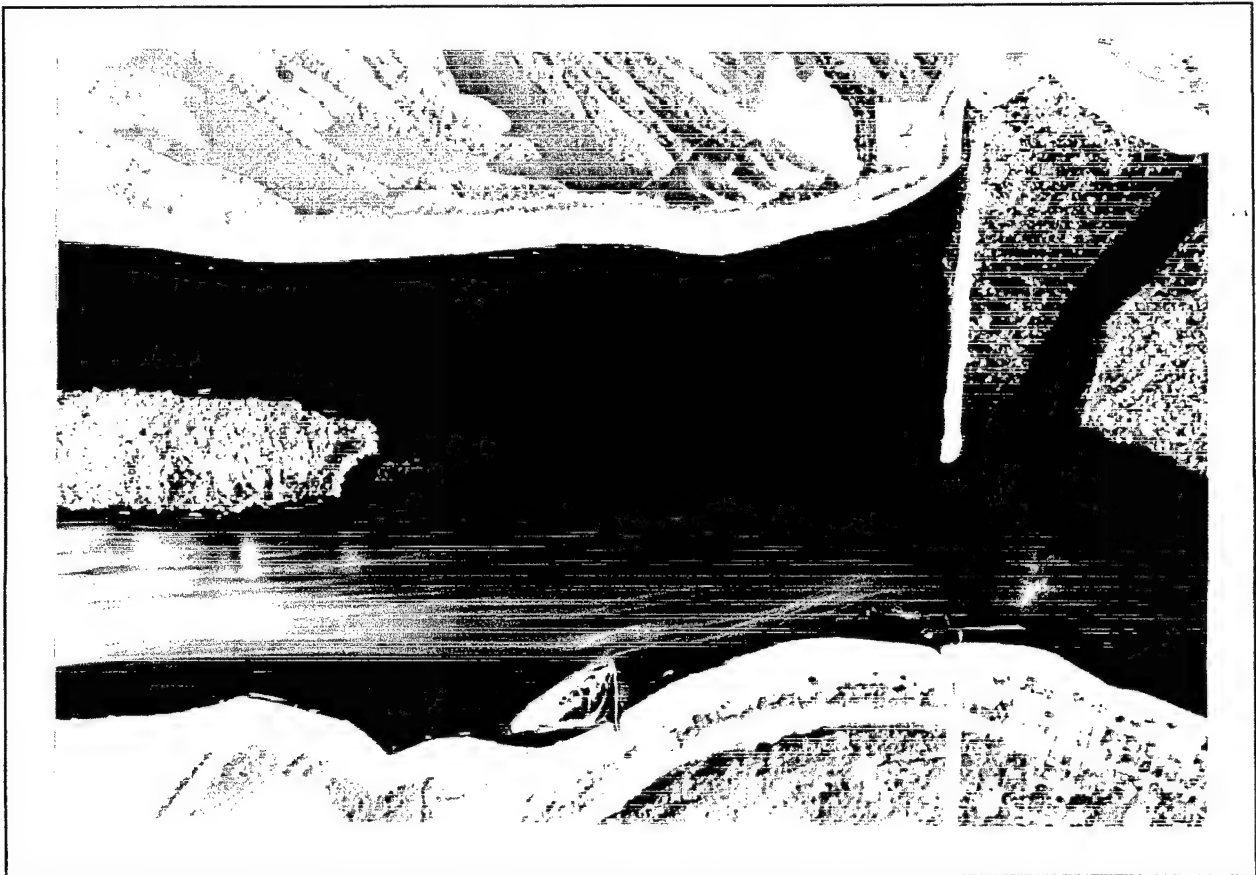
77



Elevations Referenced  
to LWRP



	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS ST. LOUIS, MISSOURI
	Lock and Dam #24 Micro Model Study Mississippi River Miles 271 - 277 Alternative Z-0
PREPARED BY: B. Corbett DRAWN BY: B. Corbett CHECKED BY: R. Denney	1500' 0 500' 1000' 1500' DESIGN FILE: 8-1000-MODEL/LWP-24N PLOT SCALE: 1" = 2000'
PLATE NO. <b>78</b>	



U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

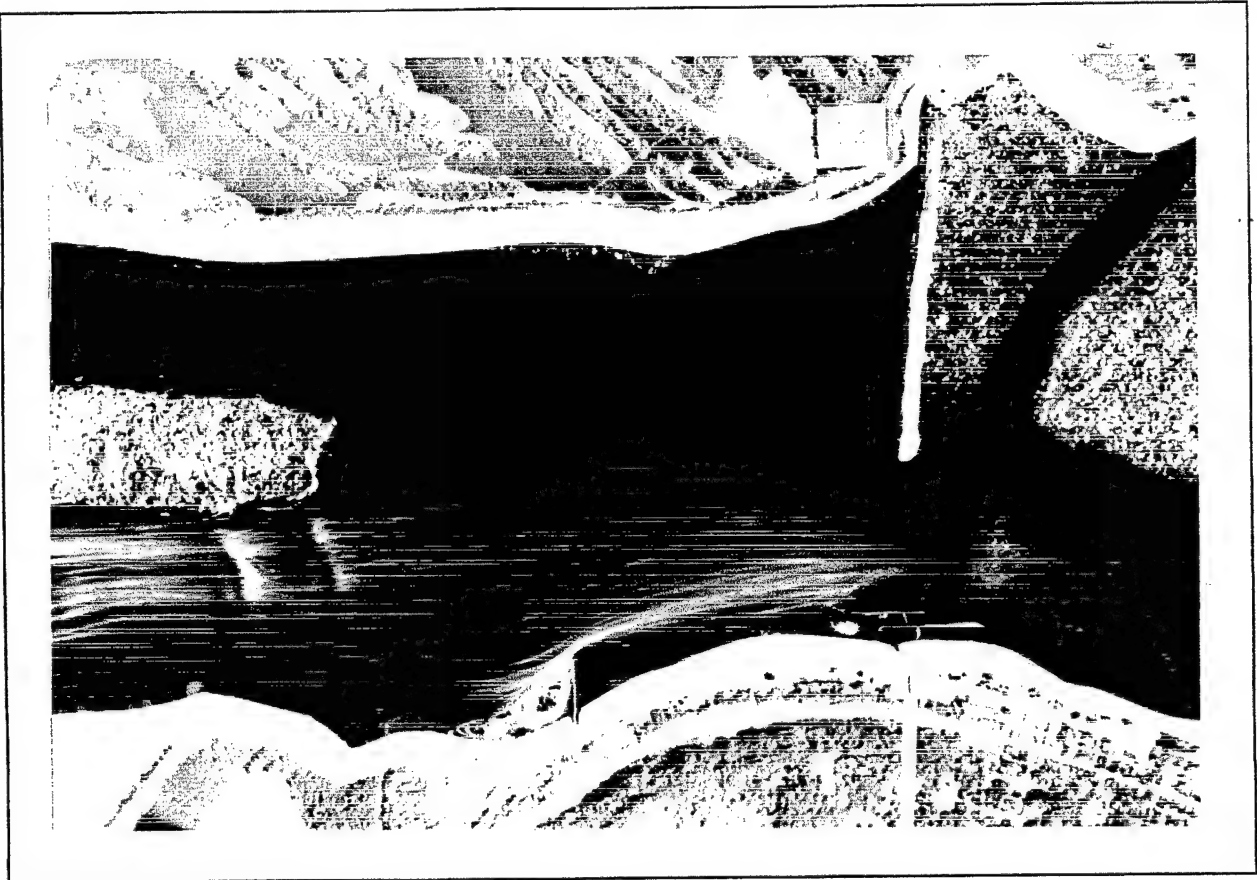
PREPARED BY: D. Gordon  
CHECKED BY: R. Davitroy

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277  
Flow Visualization - Alternative Z-0

PLATE NO

79





U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Delinoy

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277

Flow Visualization - Alternative Z-1

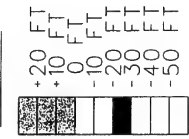
PLATE NO

81

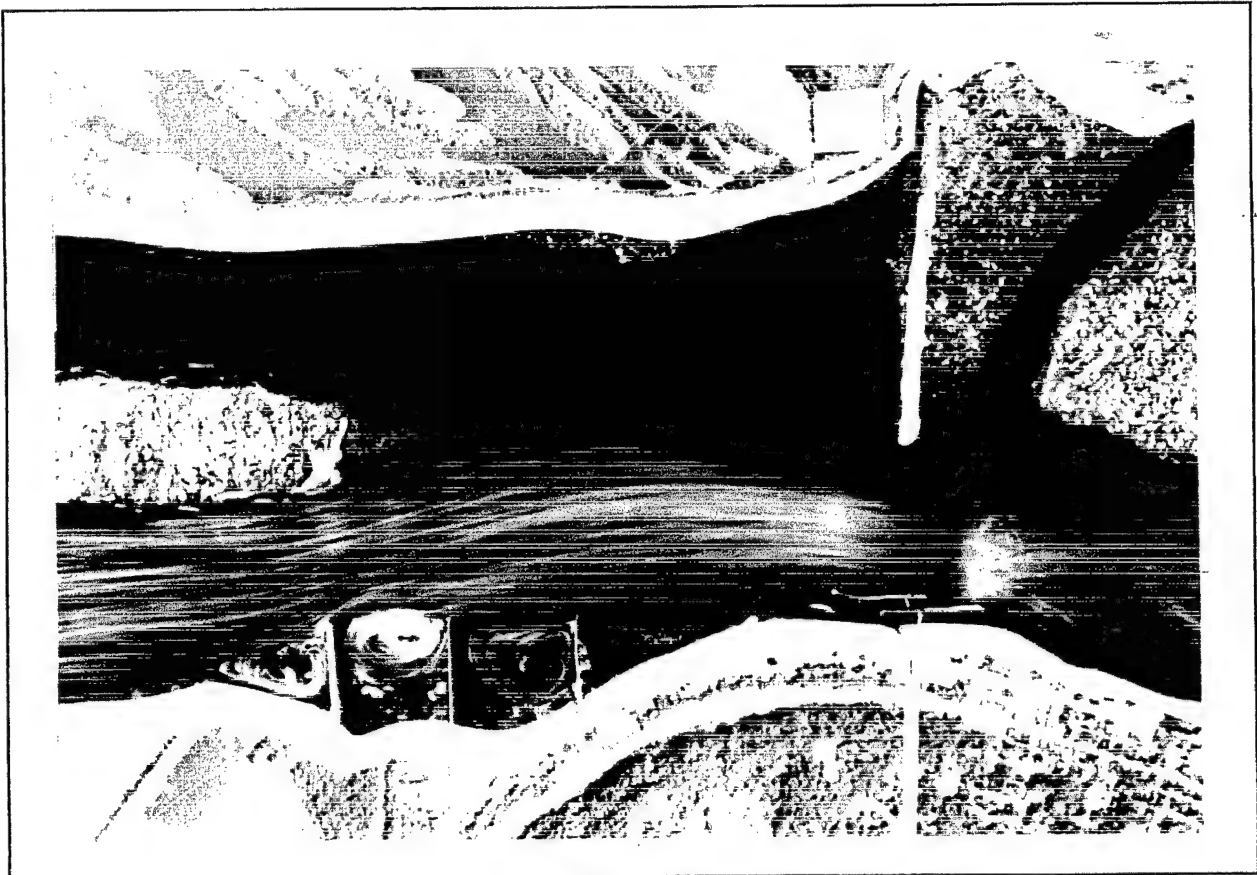




Elevations Referenced  
to LWRP



	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS ST. LOUIS, MISSOURI
	Lock and Dam #24 Micro Model Study Mississippi River Miles 271 - 277 Alternative Z-2
PREPARED BY: S. Gordon DRAWN BY: S. Gordon CHECKED BY: R. Doney	
DESIGN FILE: D-1000-1100-111 PLOT SCALE: 1" = 3000' DATE: 8/2/82 PAGE NO: 82	



U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

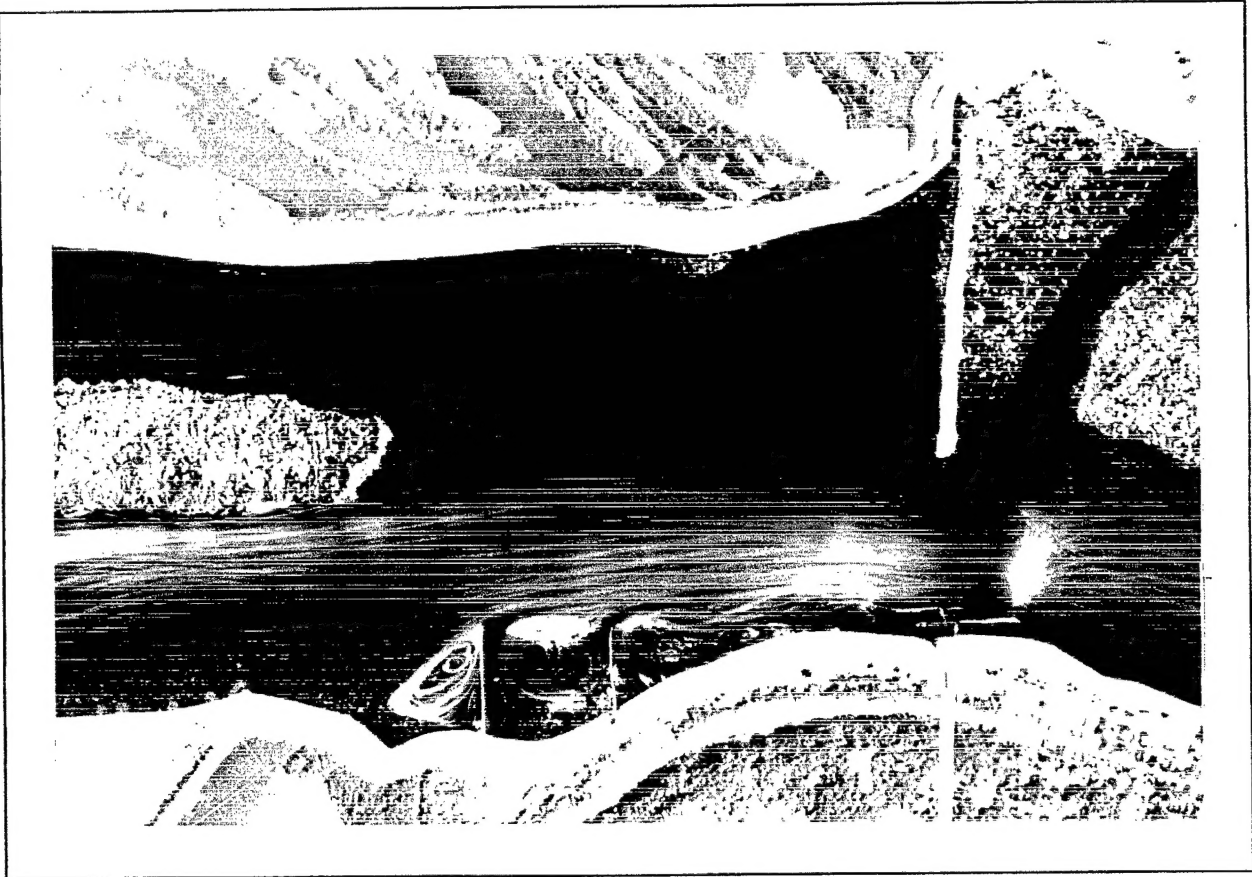
PREPARED BY: D. Gordon  
CHECKED BY: R. Denviray

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277  
Flow Visualization - Alternative Z-2

PLATE NO

83





U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

PREPARED BY: D. Gordon  
CHECKED BY: R. Dainroy

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277

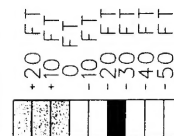
Flow Visualization - Alternative Z-3

PLATE NO

85



Elevations Referenced  
to LWRP



PREPARED BY: B. Gordon  
DRAWN BY: B. Gordon  
CHECKED BY: R. Sawyer

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI

Lock and Dam #24 Micro Model Study  
Mississippi River Miles 271 - 277  
Alternative Z-4

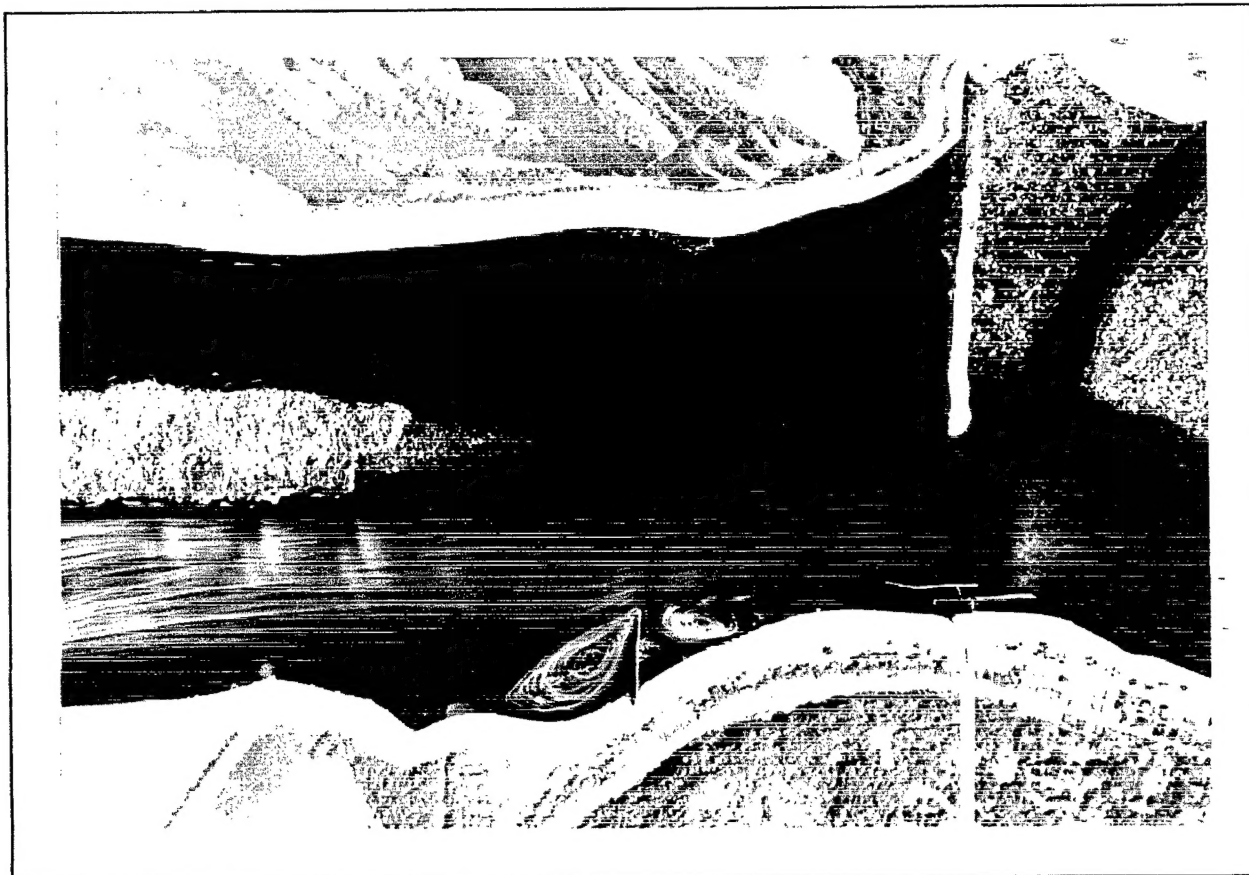
1500' 0' 500' 1000' 1500'

DESIGN FILE: D-100-MODEL-LWRP-21A

PLOT SCALE: 1" = 2000'

PLATE NO.

86



**U.S ARMY ENGINEER DISTRICT, ST. LOUIS  
CORPS OF ENGINEERS  
ST. LOUIS, MISSOURI**

PREPARED BY: D. Gordon  
CHECKED BY: R. Damvrey

Lock and Dam 24 Micro Model Study  
Mississippi River Miles 271 - 277  
Flow Visualization - Alternative Z-4

PLATE NO

**87**